ARMY ORDNANCE

The Journal of the Army Ordnance Association — Now in its Twentieth Year of Publication

Pledged to Public Service in Effecting Industrial Preparedness for War as Our Strongest Guaranty of Peace

Volume XX | MARCH-APRIL, 1940 | No. 119

CONTENTS

		PAGE
Submarine Mine		Frontispiece
The War in Europe	By Maj. Gen. J. F. C. Fuller	291
Ordnance with the Cavalry	By Lieut. Col. Robert W. Daniels	299
Our Steel Industry and Defense	By T. M. Girdler	304
Submarine Mines	By Capt. J. E. Harriman	306
Underwater Defense	(Pictorial)	309
War Contracts	By Lieut. Col. John P. Dinsmore	317
Month by Month		322
New Horizons	An Editorial	324
Association Affairs		325
Ordnance in Review	By Lieut. Col. Calvin Goddard, Ord. Res.	330
From the Record		332
Book Reviews		334
Index of Advertisers		355

Published by the Army Ordnance Association, Suite 806, The Mills Building, Washington, D. C. Managing Editor: L. A. Codd. Associate Editor: R. E. Lewis, Jr. Authors alone are responsible for statements made and opinions expressed in their respective articles. Copyright, 1940, by the Army Ordnance Association, Washington, D. C. Permission to republish is reserved.

Issued bimonthly. Single copy 75c (by mail). Subscription rate: continental U. S. $4.50 annually; foreign $5.00, in advance. Entered as second-class matter August 14, 1920, at the Post Office at Washington, D. C., under the Act of March 3, 1879. Additional second-class entry at the Post Office at Richmond, Va. Three weeks' notice before next issue required for change of address.

The Army Ordnance Association

THE Army Ordnance Association is a national organization of American citizens pledged to industrial preparedness for war as our nation's strongest guaranty of peace.

The Association endeavors to keep alive an interest in and knowledge of the design, production and maintenance of munitions. Other than a few manufacturing arsenals—six in all—there is no peace-time industry for the production of ordnance. Should war unhappily come again, industrial America will be called upon to produce munitions in great quantity and of intricate and unusual design. In an emergency, time will not permit careful study or long preparation for the production of munitions. The problem is one of vital concern.

The Army Ordnance Association believes that the solution of this problem, based on experience, lies in an active organization at all times coöperating with the Government. The principal objective of the Association is an active membership of American citizens, on whom the duty of design and production of munitions will fall in war, who will have an accurate and authentic knowledge of the complex requirements of ordnance. "Peace insurance" in this form is the foremost aim of the Army Ordnance Association.

The Association is devoted solely to the national defense; it has no commercial interests, no political alliances, and no religious affiliations. It is not operated for profit: its income is expended in furthering its aims. Its officers and directors serve without remuneration. Membership, to which American male citizens are eligible, is four dollars a year. (Application on request.)

ARMY ORDNANCE, the journal of the Association, is published solely for the purpose of disseminating information on the progress of our munitions developments so that American industry may at all times know its responsibilities to the common defense.

The objectives of the Association as set forth in its Constitution are:

To assist in effecting industrial preparedness for war as being one of the nation's strongest guaranties of peace;

To keep available the highly specialized knowledge necessary for arming the manhood of the nation by stimulating interest in the design and production of ordnance material;

To promote mutual understanding and to effect coöperation with American scientists, inventors, engineers and manufacturers in civil life and the Regular and Reserve officers of the Ordnance Department;

To provide, when required, the services of competent committees to investigate and report upon special ordnance subjects;

To assist in developing and maintaining an efficient personnel, both commissioned and enlisted, for the units required for Ordnance Field Service in the event of an emergency;

To commemorate the services rendered by the industry of the nation and by the officers and civilian employees of the Ordnance Department in the wars in which the United States has been engaged.

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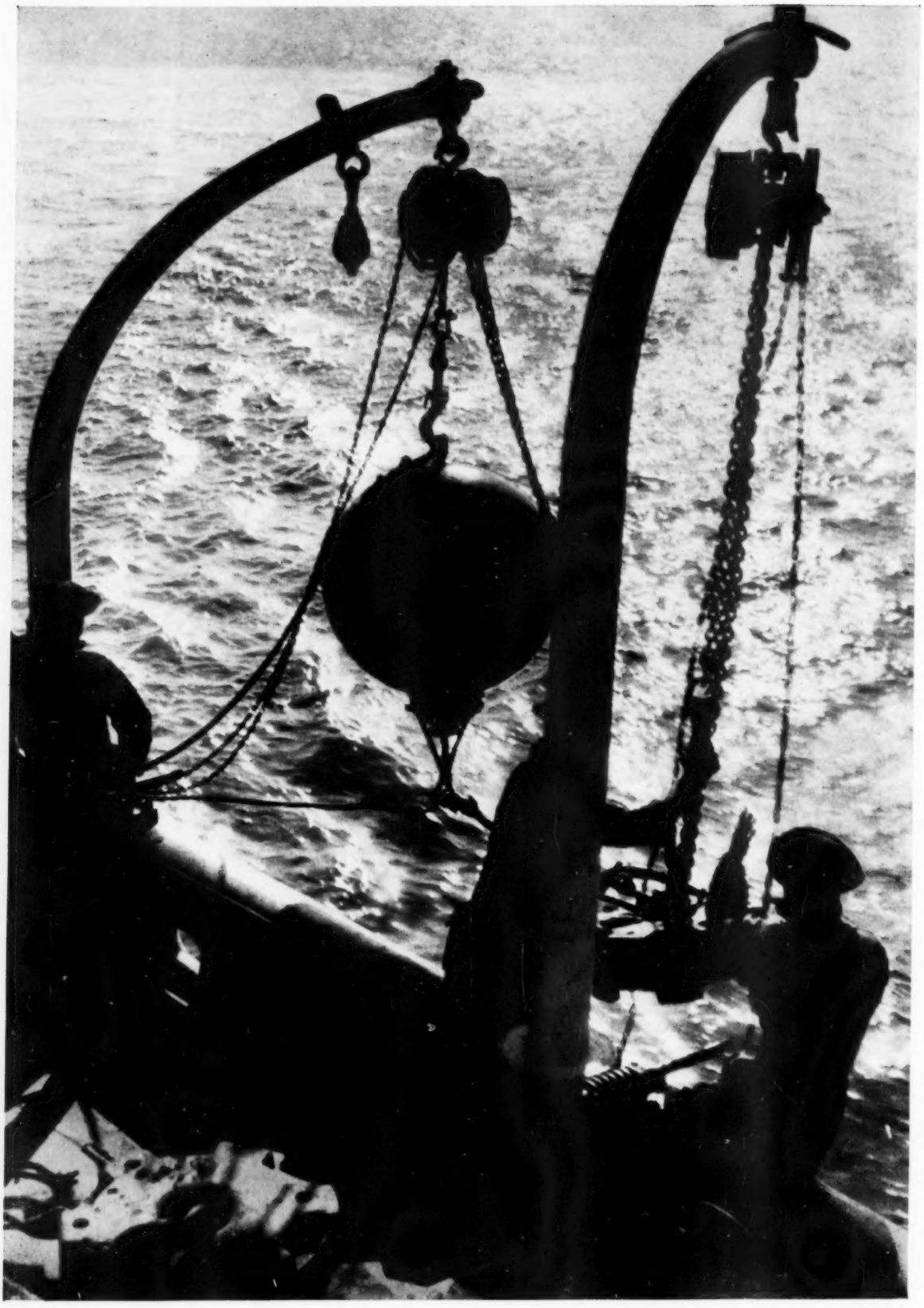

Submarine Mine

ARMY ORDNANCE

Volume XX MARCH-APRIL, 1940 No. 119

The War in Europe

An Estimate of the Situation and a Forecast

By Maj. Gen. J. F. C. Fuller*

THE war which is being fought in Europe is literally a war in the dark. The rigid press censorship now established in all belligerent countries as well as the unceasing propaganda have created such uncertainty that it is totally impossible to place much reliance on the printed or spoken word. Therefore I shall make no attempt to write this article as a connected account but, instead, as a series of glimpses into Shadowland; and in order that these may be impartial I shall set aside all questions of right and wrong, of good and evil, of bad faith and personal responsibility, because at present they are inextricably confused.

What were the causes of this war? Obviously, the full answer to this question cannot be given yet. Nevertheless, unless some attempt is made to answer it, the war aims of the contending parties must and will remain shadowy and obscure.

To begin with, all pretexts must be set aside. The German invasion of Poland was no more the cause of the present war than the assassination of the Archduke Ferdinand was the cause of the last one. Nor is Hitlerism in itself a fundamental cause, for it is the effect of such a cause—the roots of which creep back into the Reformation and the War of American Independence.

Both these great historical upheavals witnessed the death and the birth of an age. Whilst the first saw the foliation of the British oceanic empire and the desiccation of the Holy Roman—that shadow of the Eternal City Empire—the second witnessed the birth of the American continental empire—a challenge to the British oceanic.

Whilst the idea behind the one was self-interest, the idea behind the other was self-sufficiency. Self-interest drove the English into every corner of the globe; self-sufficiency slowly built the American colonies, provinces, and states into the most self-sufficing nation this world has yet seen—an empire which, in the nineteenth century, inevitably would have challenged the existence of Great Britain had the War of Independence been fought a hundred years earlier.

This principle of self-sufficiency was adopted by Napoleon and became the kernel of his Continental system—the bone of contention between him and the English oceanic system of free trade, open markets, and foreign loans. In turn, this principle, digested with the philosophy of Fichte, Hegel, Nietzsche, Möller van den Bruck, and others, gave rise to the idea of the German self-sufficient state, and the will for *lebensraum,* or economic space in which to develop.

"Autarchy [the basis of National Socialism and Fascism]," writes M. J. Bonn—an American historian—"is not a mere policy; it is a creed based on the concept of the national state as a kind of living physical organism [the Fascist corporate state]. Such a body may have contacts with other bodies politic; it cannot afford to get its organs tangled up with theirs nor have its vital functions dependent on their activities."

In short, the war now being fought is as much a war between two world conceptions as were the wars of religion in the sixteenth century and the Thirty Years' War in the seventeenth. This war is also a continuation of the Napoleonic wars of oceanic against continental power—the one aiming at keeping open continental markets and the other at absorbing them into a vast tariff-tight self-sufficient Zollverein or customs union—like the U. S. A.—under the hegemony of Germany. This is borne out by the similarity between the economic systems of Hitler and Napoleon.

When at St. Helena, the Emperor explained his system to Las Cases as follows: "Agriculture—the soul, the first basis of empire. Industry—the comfort and happiness of the population. Foreign trade—the superabundance, the proper application of the surplus of agriculture and industry." In other words, whilst the English system, neglecting agriculture, looked upon industry as the means of stimulating foreign trade and fostering loans, by his system, France was to be rendered self-sufficient, and only then was foreign trading to be indulged in. This, today, is the National Socialist system.

To Napoleon, interest on foreign investments was no more than the toll paid by a conquered people, a people reduced to financial serfdom. Therefore he would have nothing to do with loans, and in consequence, as the English system depended for its vitality on them, war with England was inevitable. Rightly or wrongly, I maintain that for identical reasons the present war was inevitable, because Hitler's outlook on finance is similar to Napoleon's. On January 30, 1937, Hitler said: "The community of the nation does not live by the fictitious value of money, but by real production which in its turn only gives value to money. This production is the real cover of a currency, and not a bank or a safe full of gold!

*Author: "Hints on Training Territorial Infantry," 1911; "Training Soldiers for War," 1914; "Tanks in the Great War," 1920; "The Reformation of War," 1923; "Sir John Moore's System of Training," 1925; "British Light Infantry in the Eighteenth Century," 1925; "The Foundation of the Science of War," 1926; "Imperial Defence, 1588-1914," 1926; "On Future Warfare," 1928; "The Generalship of Ulysses S. Grant," 1929; "India in Revolt," 1931; "Lectures on F. S. R. II," 1931; "Lectures on F. S. R. III (Operations between Mechanized Forces)," 1932; "War and Western Civilization, 1832-1932," 1932; "General Grant (A Biography for Young Americans)," 1932; "The Dragon's Teeth (A Study of War and Peace)," 1932; "Generalship, Its Diseases and Their Cure," 1933; "Grant and Lee (A Study in Personality and Generalship)," 1933; "Empire Unity and Defence," 1934; "The Army in My Time," 1935; "Memoirs of an Unconventional Soldier," 1936; "The Last of the Gentlemen's Wars," 1937; "The Decisive Battles," 1939. Special correspondent, London *Daily Mail*, Italo-Abyssinian War. Major General, British Army, Retired. C. B., C. B. E., D. S. O. London, England.

And if I increase this production I consequently increase the real income of my fellow citizens, and if I decrease it, then I also decrease their income, no matter what wages are being paid." In other words, self-sufficiency alone is wealth.

NOT only is the similarity between the Napoleonic and National Socialist economic and financial systems most marked, but likewise the similarity between the careers of the French and the German dictators. Both were unknown soldiers who rose out of obscurity during a revolution. Both were raised to power by an overwhelming plebiscite. Both created great armies, were largely occupied with public works, and both were great road builders. Both demanded colonies and both were producers of synthetic substitutes. Napoleon said: "I had naturalized sugar and indigo in France, and I should have naturalized cotton and many other articles of foreign produce. I should have knocked up the colonies, if we had continued to be denied a share in them." Has not Hitler said the same things? Further, when Napoleon at St. Helena proclaimed to Colonel Wilks: "With us . . . national prosperity and science advanced beyond measure; yet your ministers proclaimed through all Europe that the French were overwhelmed with misery and were retrograding to a state of barbarism," have we not heard similar words from the mouth of Hitler?

It would, therefore, seem clear that the present struggle is but a continuation or repetition of the conflict of 140 years ago—a struggle between the oceanic and continental conceptions of empire. Consequently, when today the British and French Governments proclaim that the war is being waged against Hitlerism, this is only true when by that word is meant the establishment of an autarchic empire, which is not to be confused with mere aggression.

As Mr. Bonn explains in his book, "The Crumbling of Empire," in such an empire "trade friction would disappear; territorial aims would be abated. The specter of foreign wars would vanish, and with it the necessity of maintaining powerful armies to keep open the sea lanes in time of war. Armaments could be dispensed with, and with them the necessity for organizing the nation's economic forces for such an emergency. . . . No new racial conflicts, the result of migrations, would arise. . . . International lending would cease, and with it the attempts to 'enslave' foreign communities by putting them to financial bondage. Debtors could free themselves of their obligations without resorting to repudiation, for the creditor nations themselves would insist on canceling their obligations, which must be settled by importing goods or services. Currencies could be manipulated regardless of foreign exchange; price levels could be raised or lowered internally whenever the position of a particular group needed an adjustment. . . . Planning and coercion might not be too high a price to pay for peace and progress, if they could but be had on these terms."

Accepting these possibilities, which have been proved by the United States, as a basis of argument, and leaving out of the question which of the two systems is morally, economically, and politically the more suited to forward the welfare of Europe and the world, it is obvious that whilst the British Empire is not vitally threatened by a Continental power following the principle of self-interest, its very life is at stake when such a power aims at becoming self-sufficient. It was for this reason that we fought France for twenty-two years; it is for this reason that we now are at war with Germany.

Having diagnosed what I believe to be the fundamental causes of this war and, in consequence, having simultaneously defined its conflicting aims, I will turn to its strategical, and later on to its civil foundations.

In examining this vitally important subject, I will turn first to Great Britain and her empire, because I believe the supreme fact in this war is that their existence is at stake, and I will attempt to answer this qusetion: How arose the strategical situations in which they were placed at the outbreak of the war?

As we are an oceanic empire, it should have been obvious to our statesmen that, directly the last war ended, our security depended upon oceanic strategy; that is, the strategy of communications—a strategy which their predecessors unfailingly had observed since the days of Cromwell. Instead, from 1919, when Great Britain became a member of the League of Nations, what do we see? The total abandonment of this strategy for its continental counterpart; namely, a strategy of areas. This led to the most profound consequences which undermined not only the Empire but also the centuries-old foundations of world stability.

First, the old Victorian Empire, which had been badly shaken by the South African War, was dissolved in 1931 by the Statute of Westminster and replaced by a loose confederation of self-interested nations (each aiming in one way or another at a modified form of autarchy) which, being uncoördinated, was detrimental to the unity of the whole. Secondly, springing from this change, British foreign policy ceased altogether to be based on oceanic strategy and instead became pivoted on maintaining the *status quo* of a large number of political areas established or supported by the peace treaties: a fulcrum so unstable that no foreign minister could foretell in which direction his diplomatic lever would slip next.

Thirdly, the whole League system, which for its effectiveness depended on the collective might of its numbers, was wrecked not by the exclusion of the vanquished powers nor by being jilted by the U. S. A., but because Great Britain, forthwith setting out to recapture her former financial world supremacy (which demanded drastic economies) disarmed and in consequence left her partners in the lurch.

TO demonstrate this revolutionary change in policy, very briefly I will first outline what oceanic strategy demands. The easiest way to understand this problem is to look at a map of the Empire. It will be seen that it possesses a well-defined backbone or axis which runs from Vancouver Island to Quebec and thence via London, Gibraltar, Malta, the Suez Canal, Aden, and Colombo to Australia and New Zealand. It may be divided into three major sectors: the Indian Ocean, the inland seas (Red Sea and the Mediterranean) and the Atlantic Ocean, or the eastern, central, and western sectors. As long as this backbone remains intact, the Empire is a unit; but directly any one sector is broken, it is paralyzed.

There are two ways of guaranteeing axial security: (1) militarily, by being so strong in each sector that no foreign nation bordering it will dare to attack; and (2) politically, by being friendly with these nations or at least not to go out of the way to antagonize them. Of course, both methods should be combined, as in the protection of our houses from fire—the fire department representing military power and the householders' common sense representing foreign policy. Should the householder leave bottles of gasoline on his

kitchen range or drop lighted cigarette ends into his bedclothes, no increase in fire apparatus will make good his carelessness.

From 1919 to 1936, our various governments set both these methods aside. As regards the first, fifteen years of Baldwinism completely gutted our fighting forces and our national morale. As regards the second, simultaneously every possible step was taken to render the eastern sector insecure by antagonizing Japan. Bad though this policy was, still worse was to follow. In 1935, in a fit of Leagueitis we antagonized Italy in the central sector, and in order to render that sector still more untenable in war time, we next entered upon a guerrilla conflict with the Arabs at the eastern end of the Mediterranean and launched a violent propaganda campaign against National Spain in the western end. And this in spite of the fact that behind Italy and Spain lay the whole might of Germany, who smiled and smiled again as we drove one potential ally after another into her arms.

Why was it that last summer British subjects were stripped naked in Tientsin to be paraded before mobs of giggling coolies and our sole protests were words? Because the Government realized that our imperial backbone was so weak that it dared not risk a war with Japan in the Far East as long as the situation in the Mediterranean and north of it continued as it was. Had we then sent a powerful fleet to Singapore, and had we launched from that fortress a naval attack on Japan, or even had we threatened such an attack, Mussolini could and probably would have slammed the Mediterranean door on the back of that fleet, and Hitler, seeing us engaged in a war of the first magnitude in the Far East, would have been a fool had he not simultaneously opened the floodgates of a European conflict.

SUCH was the harvest of our unfortunate foreign policy. In spite of our naval supremacy we have never been in a position simultaneously to wage two major wars successfully on far-separated fronts. Hence, in the past, with one possible exception (1775-1783), our foreign policy has aimed at establishing strategical conditions which would prohibit such a situation. For Great Britain to fight decisively in the West demands a friendly or anyhow a neutral East, or vice versa. Why, since 1918, she has failed to accomplish this, I already have explained, so I will now turn to certain strategical repercussions related to and arising out of this failure.

In 1919, France set out to encircle Germany, and part of her plan was the construction of the Maginot Line. Eighteen years later she found herself encircled, her Great Wall of China having been turned by a hostile Italy on the Maritime Alps and by a potentially hostile Spain on the Pyrenees. By the summer of 1939 it became obvious to her that in another war she might have to divert at least 500,000 men to hold these mountain ranges, and that, therefore, she would not have man power enough to hold the Maginot Line and maintain a mobile army. Hence conscription in Great Britain, which carried with it a definite breakaway from oceanic strategy.

Again, because of this unlooked for strategical *volte-face*, France cemented an alliance with the U.S.S.R., and in the spring of 1939 Great Britain attempted to follow suit. Here I will turn to the strategical position of Soviet Russia.

Since 1917, Soviet foreign policy has been both consistent and undisguised. Its aims were and still are, whilst avoiding a war on two fronts, to establish dominion over Asia and then over Europe. The first demands the destruction of the British Empire—after the U.S.S.R. the greatest Asiatic power—and the second the destruction of Germany—today the greatest Continental power in Europe. Its instrument is the Third International, or Comintern, which for over twenty years has been waging a relentless war of aggression against all non-Communist countries. An astute politician, Stalin has no intention of pitting his Persian horde—his army of satrapies—against the Macedonian phalanx of Germany. Should he really mobilize, what will happen? He is uncertain. Should he suffer a defeat, will a counter-revolution follow? He is not sure. Yet of one thing he has no doubts—should Voroshiloff win his war for him, his own head will at once go into that soldier's haversack. Hence the reason for his wholesale purges.

Whilst Stalin has been working night and day to foment a European war between the democracies and the fascistic autocracies, both of which he wishes to destroy by inducing them to destroy themselves, each abandonment by Great Britain of her oceanic strategy has enabled Hitler more assuredly to consolidate his Continental power. First, when Great Britain was entangled in the Abyssinian War, he reintroduced conscription and reoccupied the Rhineland. Secondly, when she was entangled in the Spanish War, he occupied Austria and Sudetenland. This led to the September crisis of 1938 and the Munich compact, which was nothing more than a mutual mobilization agreement because Great Britain was not ready and because Germany's western front was still unfortified.

THE question may now be asked: Could the war, to which this mobilization led, have been avoided? I think it could have, had we realized that, throughout these many crises, Russia and not Germany was our most formidable enemy. Why and how? The answer is that, except for the United States, Russia is the most self-sufficient power in the world—far more so than Germany is or is ever likely to be. Further, the Soviet policy is, as I have stated, to gain dominion over Asia and Europe. Should this aim be accomplished, the U.S.S.R. will far outdistance the United States in self-sufficiency and become the most self-sufficing power in the world. Therefore, for years past I have suggested that, though a self-sufficient Germany is a danger to the British Empire, a self-sufficient Russia would spell its ruin.

In order to mitigate both these dangers, instead of getting involved in every European problem, we should have limited our foreign obligations to two in number. We should have said to Germany: "We will not tolerate any expansion westward, and should you attempt it, we will at once support France. Simultaneously, we will not tolerate a Franco-Soviet war against you, and should such a war be launched, we will at once support you."

Obviously, this policy carries with it a free hand for Germany in Central and Eastern Europe, and the common argument against it is, that given a free hand to expand eastward and southward, instead of doing so economically, Germany would have set out to conquer the Balkans, Poland, and the Baltic States, and would have become so immensely strong that, intoxicated with power, she next would have turned westward and would have swallowed up the rest of Europe.

Yet, had they been undertaken, would not these eastern conquests have willy-nilly forced Russia into the field and have led to a deadly conflict between Russia and Germany,

which in itself would have prohibited any western German expansion? Further still, would not such a war also have forced Italy back into our arms? And, in turn, would not such an event have gone far to reëstablish the security of our imperial backbone and have placed us in a position to impose our will upon Japan? Instead, by our blank check to Poland —for this is what our guarantee amounted to—we surrendered our command in Asia, and then, in order that this check might be honored, we turned to Russia, our most formidable enemy, and begged her to guarantee our guarantee.

What was the result? In August, Stalin played his ace of trumps. Knowing that above all things Germany feared a war on two fronts, and calculating that our guarantee to Poland rendered war inevitable, without any intention of engaging in organized warfare he forced Hitler to enter into alliance with him. This, by restricting the forthcoming struggle to a tussle between Great Britain, France, and Germany, gave him a free hand to do as he pleased in the Baltic and in Scandinavia, possibly also in the Balkans and possibly also in Asia. Further, should this war prove a long one—and it is he alone who can keep the pot boiling—at its ending Europe will be prostrate at his feet. Such were the strategical probabilities, when, on September 1, 1939, Germany invaded Poland.

THOUGH, as I have shown, foreign policy, to be effective, must rest on well-considered strategical foundations, in their turn, these foundations rest upon the will and endurance of the nation itself. Consequently, the relationship between these civil foundations and strategical action forms the basis of war policy. This relationship may be stated as follows: Because peace is normal existence and war is abnormal, and because the aim in war is to undermine the organization of a nation as well as of its fighting forces; and because the nation is the moral and economic base of these forces, it follows that the less normal existence is changed or compelled to change, the longer is the nation likely to endure a war. This is a fundamental truth.

In order to secure this normality, continental nations in the past have raised great armies, not only to defeat their enemies, but also to shield their peoples and governments so that their respective civil inhabitants may supply them with the munitions of war and maintain the trade, well-being, and life of the nation itself. In turn, we, an oceanic power, have for generations past maintained a great fleet to command the seas, not only to prohibit invasion but to secure the maintenance of overseas supplies and trade. Since then, the security thus afforded has undergone a radical change because of the rapid development of the airplane and the radio, which are 3-dimensional weapons of war and not 2-dimensional, as are fleets and armies.

Whilst the movements of armies and fleets can be restricted by obstacles, fortifications, and coast lines, those of the radio and airplane are virtually unrestricted, the first transcending space and time and the second being limited only by distance. The result is that, irrespective of the size and strength of a nation's fighting forces, the will and endurance of its civil population can be attacked directly. The consequence is that terror, rather than danger, has become the supreme factor in war, and in turn this has effected a profound change in the character of the civil base.

I will turn first to the airplane. For years past many of its adherents have proclaimed that the next war would start with an intensive attack on the civil population in order to terrorize it into forcing its government to abandon the war. Though the lurid pictures painted by these enthusiasts are strictly logical, I have never accepted them, because I believe human nature to be illogical. Twelve years ago I wrote:

"It appears unlikely that at the beginning of a war any nation will embark on extensive air attack against its enemy's civil population. This must not, however, lead us to assume that later on in the war such attacks will not take place. . . . The question now arises: When, strategically, is the correct moment to attack the civil will? The answer is: When supply will enable not only command of the air being gained but will render possible a prolonged concentration of attack on definite centers. Again, there is another factor which must be considered; namely, the moral one. The attack should be launched either immediately after the enemy has suffered a disaster on land or sea, or when some great effort on his part has failed, or when an economic blockade of his ports or factories is beginning to be felt. It will be seen, therefore, that the correct time to launch the air attack is closely related to events on land and sea."

These views I hold still; nevertheless I did not expect that the so-called "air experts" would be proved as correct as they have been, because the terror they stimulated has been such that Great Britain, France, and Germany, instead of setting out to destroy hostile cities and civil populations, not only have abstained from such attacks, but have been terrified into replacing them by defensive measures which have proved themselves to be as disastrous, if not more so, than the offensive they are intended to frustrate.

THESE "experts" went wrong in pinning their faith on killing and destroying, instead of on demoralizing and disorganizing. What they proclaimed was that, as power of government depends on the stability of the civil will, directly this will is broken government must collapse. This, however, is at best but a half-truth; because as long as the military and police forces remain loyal, a civil population, whether its will is broken or not, can be prevented from revolting. The full truth is that it is not fear of death which brings collapse, but lack of means to maintain life and military power.

A moment's thought will make this clear. Suppose that Germany decides to strike at our civil will, will she strike at Cheltenham and Tunbridge Wells, or at Coventry and Birmingham? Or is it reasonable to suppose that she will raid Hampstead in preference to the Port of London? Obviously Coventry, Birmingham, and the Port of London are more profitable targets, not because they are inhabited by masses of men and women, but because they contain vast numbers of industrial workers. And if work can be brought to a full stop in such places as these, a sane enemy knows that his opponent's military strength will collapse far more rapidly than if a hundred Cheltenhams were paralyzed.

Therefore the true object of air attack is to stop work and not to kill women and children. In brief, it is to upset the normal existence of the enemy nation. Therefore it follows that whatever means we employ to defend ourselves against such attacks, our aim must be first and foremost to prevent this. Yet what have we done? Following the theory of the experts that the safety of the individual is of higher importance than the security of the community as a whole, we have set this aim aside, and without thought of consequences

not only have established a totalitarian darkness called a "blackout," which culturally has plunged us back into the Dark Ages, but within forty-eight hours of war being declared, by evacuating millions of women and children from our great cities, we have upheaved, as no possible air raid could have done, the social, economic, and financial foundations of the nation.

What are the results? Millions of people are being needlessly terrified, bored, and demoralized; family relationships are destroyed; thousands are daily being thrown out of work; innumerable shops and businesses are going bankrupt; schools are closing down; hotel and private residences are being requisitioned, and road casualties have been doubled, in consequence of which insurance companies are at wit's end to meet their disbursements. The repercussions are infinite, and the abnormality resulting so universal that, as long as present conditions continue, the question may well be asked: Why should our enemy attack us?

In short, fear of air attack has resulted in our blockading ourselves. Not only are we demoralizing our people, but we also are unhinging our industries and more especially those which sustain our foreign trade which pays for our imports. Therefore, as long as present conditions continue, how can we meet the cost of the war? To fail to do so means inflation, rise in the cost of living, rise in wages, another rise in the cost of living and so on, until quite possibly we may find ourselves unable to pay for our imported foods and raw materials.

The logical end of this vicious circle is bankruptcy, collapse, and finally revolution—not because our cause is necessarily an unjust one, or our people cravens and cowards, but because we have launched an attack on normality by enforcing a cure which is worse than the disease. In the nation, as in the individual, marked abnormality is a sure sign of madness.

AS the object of air defense, applied to the civil population, is to secure normal conditions, the aim of propaganda is the reverse; namely, to establish an abnormal outlook by stimulating the national credulity, undermining the enemy's morale, and winning neutral support. The means employed are misrepresentation, exaggeration, and mendacity. Every virtue must be attributed to one's own side and every vice to the enemy's, until a violent and totally irrational Manichæan ideology is engendered. In brief, propaganda may be defined as the art of audacious and persuasive lying, the power of which depends not on the likelihood of the crime imputed, but on its abnormality. Thus, brutality must be monstrous, injustice overwhelming, and duplicity immense.

The technique required has been minutely examined by Lord Ponsonby in his book "Falsehood in War Time," which is a complete treatise on this subject. From it I will extract one example which shows this technique at its best. On the fall of Antwerp in 1914, the *Kölnische Zeitung* reported: "When the fall of Antwerp became known, the church bells were rung" (meaning in Germany). Thereupon *Le Matin* stated: "According to the *Kölnische Zeitung,* the clergy of Antwerp were compelled to ring the church bells when the fortress was taken." The *Times* then went one better, saying: "According to what *Le Matin* has heard from Cologne, the Belgian priests who refused to ring the church bells when Antwerp was taken have been driven away from their places." Whereupon the *Corrière della Sera* reported: "According to what the *Times* has heard from Cologne via Paris, the unfortunate Belgian priests who refused to ring the church bells when Antwerp was taken have been sentenced to hard labor." This stimulated *Le Matin* to return to the charge with: "According to information to the *Corrière della Sera* from Cologne via London, it is confirmed that the barbaric conquerors of Antwerp punished the unfortunate Belgian priests for their heroic refusal to ring the church bells by hanging them as living clappers to the bells with their heads down."

There can be no doubt that during the last war British propaganda proved so effective that it was one of the main causes of the German collapse in 1918. Also, as Hitler informs us, after that war he closely studied it and made use of its technique in winning his way to power. Meanwhile we abandoned it, and then, on the declaration of war in September 1939, we returned to where we had dropped it, and have since discovered that it has lost its edge. Why? Because we overlooked the essential fact that, to be effective, propaganda depends on the conditions of the moment. We forgot that in 1918 Germany was cracking up—socially and economically; that her people longed for the ending of the war and in consequence were susceptible to the propaganda we employed.

Twenty-one years later, conditions were diametrically the reverse; yet our propaganda was the same in kind: Göring and his Bradford butter; the nice soft woolies we could buy; talks on food; the shooting of German generals and princes, etc., etc. We overlooked the fact that we were fighting a religion and not a material thing, and instead of acclaiming the self-sacrifice of our people (the basis of all religion), we proclaimed their self-interest in the good things of this world (the negation of all religion). We did so in order to make the mouths of our enemy water, and instead to them it only accentuated our decadence.

STRANGE as are the strategical and civil foundations of this war, stranger still is the character of the war itself. It is not the war we expected or prepared for, and, above all, it is not the war we want; for though our Government has proclaimed that we are preparing for a three years' conflict, seeing that Germany is economically far better placed than she was in the last war, and remembering that that war lasted more than four years, I see no reason why this present war should not last seven years or even longer. Yet I am certain that it will not, if only because such a prolongation seems reasonable.

Already the unexpected has taken over supreme command; nevertheless there is no reason why it should have if our Government, its ambassadors and agents had been less wishful in their outlook. When I happened to be in Berlin in February 1939, it became quite clear to me that an alliance between Germany and the U.S.S.R. was in gestation. Then when I happened to be there again in April—during the Hitler birthday celebrations—whilst sitting with a friend in the lounge of a hotel, he said to me: "You want to know what all this (the annexation of Czechoslovakia) will lead to? Well, here is a guess (I since have realized it was something more): First, your Prime Minister's guarantee to Poland will go down in history as the most enormous blunder committed by your country since the Stamp Act (1765). Secondly, when war comes along, as it now inevitably must, Poland will be overrun in a minimum of three weeks and a maximum of six. There will be no fighting, worth calling, on the

Western Front. There will be no air bombing of cities, and Italy is likely to remain neutral."

Of the U.S.S.R. he said nothing; yet so convinced was I by what so obviously was in hand that, in June, I wrote in an article: "If war comes it will probably lead to an amicable repartition of Poland between Germany and Russia." When these views were communicated to responsible people in England, they led to my being proclaimed "pro-German"! Most certainly this is a war of the unexpected.

We expected a *Blitzkrieg,* and the one which was launched was of such lightning brilliance that we closed our eyes and since have kept them shut and are still waiting for Hitler to thunder at the Western Front. Is this reasonable? No, because tactics are related to conditions as intimately as is propaganda or foreign policy—or at least they should be. The *Blitzkrieg* has come and gone, and one day it will be classed as a very remarkable operation of war which bore out much predicted by advocates of mechanized attacks on unfortified fronts. It is worthy of a brief examination, because at some future date conditions may favor its repetition.

THE tactics adopted by the Germans in their Polish campaign of September 1939 sprang directly from the method of attack developed by their general staff toward the end of the last war and again proved during the Spanish Civil War. In 1918, under cover of low-flying aircraft, small formations of shock troops advanced and were followed by nonshock units. The airplanes forced the enemy to keep his head down in his trench; the shock troops discovered weak points and penetrated, and the nonshock units exploited these penetrations. These tactics were very successful, and, bearing them in mind, what do we see during the recent campaign in Poland? As far as can be gathered from the yet-meager reports, an almost identical method of attack, but this time raised to a motorized level. Further still, the vast salient in which the Polish armies were placed and the overwhelming superiority of the German aircraft, as well as the reliance of the Poles upon cavalry, favored these tactics.

On this wide front it would appear that the Germans launched three groups of armies—one from the north, one from the center and one from the south. Their tactics were as follows: An advanced guard of airplanes was sent out fifty and more miles ahead of the advancing columns to strike at the Polish communications, supply centers, and reserves, just as in 1918, within the range of a few miles, they struck at the field works, trench communications, and reserves in the enemy's entrenched zone.

This advanced guard was followed immediately by mobile armored forces consisting largely of tanks which, replacing the 1918 shock troops, unencumbered by infantry, moved forward at top speed and under cover of the confusion created by the air attack, smelt out weak points, penetrated them, and then threw the Polish rear into disorder and panic. In their turn, these armored shock troops were followed by motorized infantry which were rushed up to exploit or to occupy. In these tactics the main points of interest are: 1. No predetermined objectives are laid down; instead, each weak point automatically becomes an objective. 2. Utmost speed is sought after in order that the tanks may take advantage of the air attack as soon as possible. 3. Whilst aircraft clear the way and reconnoiter for the tanks, the latter in turn clear the way for the motorized infantry and upset the enemy's antiaircraft defenses.

There can be no doubt whatsoever that these tactics proved eminently successful, for Poland, not a small country, was overrun in eighteen days. If this was not a *Blitzkrieg,* then that word has no meaning.

Turning to the Western Front, we find totally different conditions. True, it would be possible and in fact easy for either side to launch powerful air attacks on each other's cities, and it is certain that such attacks would result in great damage, both moral and economic. Yet why have not these attacks been made? The answer should be obvious to all, except perhaps to the more frenzied air fanatics; namely, as I have said and will repeat: However terrified a civil population may be, it is seldom possible for it to overthrow its government as long as the fighting forces remain loyal to it. In turn, their loyalty depends upon their morale, which very largely depends upon whether they have been defeated or not. If they have not, their loyalty will remain staunch as long as they are fed, housed, and supplied with munitions; nevertheless, unless they are vigorously engaged, their munition expenditure will be low, and, consequently, reduction of munition output—caused by hostile air attack—will not be greatly felt.

The truth is that it is not solely fear of retaliation which is causing belligerents to refrain from air attacks, but also the recognition that unless these attacks coincide with extensive land operations, physical or economic, they are unlikely to attain their ends. Where the so-called air expert has gone wrong is in overlooking the fact that tactical power is not the sum of the effects of any one means or weapon, but instead is the multiple of all used in combination.

The question arising from this is: Why have not these combined attacks taken place, or why are they being delayed? And the answer is that: 1. Both the fronts in the western theater of the war are extensively fortified and all but impervious to attack, whether armored or unarmored. 2. Because, unlike in the last war, Germany cannot be besieged but only partially invested; for so long as the U.S.S.R. supports her there is little likelihood of her being starved out. In short, the Franco-British blockade has lost its sting, and in consequence the German counterblockade has gained in power and, as I will shortly show, in an unexpected way.

TO estimate what is the possible, even the probable, course of the present war it now is necessary to examine various alternative means of attack and to assess their respective values.

First, there is the physical attack, whether by land, sea, or air, the object of which is to destroy the organization and morale of the fighting forces and so compel the enemy government to capitulate. This form, on the Western Front, has been set aside since the opening of the war.

Secondly, there is the moral attack by aircraft and propaganda, the latter having been reduced to a fine art by the U.S.S.R.; yet it demands much preparation and, above all, a state of economic stringency and general discontent as its breeding ground. This form is in active operation.

Thirdly, there is the economic attack—siege, investment, and blockade—the object of which is to starve the enemy into surrender. This form of attack is patently British, and though it proved decisive in the last war, it is unlikely to do so in the present one for the following two reasons:

1. In a recent article, Capt. Bernard Ackworth, R.N., has pointed out that should German submarine and mine attacks

seriously hamper Great Britain, in order to bring Germany to heel, the British Government may be compelled to extend their blockade to include neutral countries—Holland, Belgium, Italy, etc. He writes:

"Indeed, as far as purely naval action goes, the blockade of Europe as a whole is a very much simpler matter than the blockade of Germany as long as neutral trade is passing freely between Britain and the North European ports. . . . It follows then, that so long as we can keep undisputed control of the surface of the sea at these points [Straits of Gibraltar, Straits of Dover, and the North Sea] we can control the whole of Europe, depriving it of the multitude of products from the outside world without which European countries, and particularly Germany, must languish in the course of time."

What does this imply? That in order to survive economically, neutrals will be driven into Germany's arms; that in consequence, German autarchy will be extended, and that therefore this full-blooded blockade will establish what it is intended to frustrate; namely, a European *Anschluss* centering around Germany.

2. There is yet another possibility, which so far has been largely overlooked. Hitler is fully aware of the close relationship between our financial strength and our agricultural weakness. As long as we are able to buy foreign foodstuffs at economic prices and transport them to Great Britain, it is obvious that his counterblockade will fail. Nevertheless, it is just as obvious that payment depends mainly on the continuation of our overseas trade which in turn depends on the continuation of manufactures. Should these be reduced, we shall be compelled to part with our foreign investments and then with our gold, and when these are exhausted we shall be forced to borrow at ever-increasing rates of interest, until a time may come when the cost of imported food alone will mount so high that we shall not be in the position to foot the bill. This means financial collapse and loss of the war.

THE bullseye in this target is the production of articles of trade. Therefore, if Hitler can reduce this output, the loss of every ton will be a step toward Germany's winning the war. The means whereby this may be accomplished are simple; namely, never to attack but instead constantly to threaten all neutral nations bordering on Germany and so force us to an overproduction of munitions and, in consequence, an underproduction of marketable commodities, whilst German factories are kept at full blast in order to produce commodities to barter for raw materials.

The difference between this new and the old method of blockade may be illustrated by a simple example. Should a shoemaker inhabit an island, and should the maximum number of shoes required by its inhabitants be 1,500 a year, and the maximum sales to keep his business solvent be 1,000 pairs; then it is obvious that, should these sales fall to 500, he will be ruined. It is equally obvious that should his production exceed 1,500 and mount to 2,000, 3,000, etc., he will be faced by a similar disaster.

To force us to overproduction in munitions and underproduction in trade commodities is so obviously to the advantage of Germany that Hitler cannot have overlooked this new form of blockade. Its defeat demands rigid economy in war costs and imports and free internal spending and the production of exports. Paradox though it may seem, a loan to foster exports may before long be found even more essential toward winning this war than a loan to finance the cost of the war.

Seeing how unexpected has been the character of this war, it would indeed be the outlook of a blind man to suppose that it holds for us no further surprises. Of these, the greatest may be that though our statesmen and politicians for three months now (I write on the last day of November) have been thundering against Germany and Hitler, it is far from ridiculous to suggest that before the next nine months have run their course they may discover Germany is not their enemy. Stranger still, for all things are possible in a long war, they may, before this war ends, find themselves in alliance with that country. Who then is *the* enemy? Though quite obviously today it is Germany, as obviously tomorrow it may be Russia.

First, let us not overlook the fact that, potentially though not actually, Russia is the greatest autarchic power in the world, even greater than the United States, and out of all question more formidable than Germany is ever likely to become. Secondly, as I have already pointed out, the foremost object of her Bolshevik rulers is not the destruction of Germany but of Great Britain and her Empire, because they are the champions of world capitalism—in spite of the fact that London's supremacy has now passed to New York. Were this not so, and instead did the destruction of Germany take precedence, would not Stalin have agreed upon an alliance with Great Britain and France? That he did not do so is sufficient proof of what his object is.

So far he has played an extremely cunning, yet open, game—indeed, so straightforward that we have been misled into supposing that Russia has sloughed her Bolshevik skin and changed her revolutionary spots. Why responsible British statesmen have openly assumed that Russia has abandoned her revolutionary practices and is fast developing into an orthodox democratic state has been due, not to a change of Soviet policy, but to varying methods of approach. What they have failed to realize is that "in the East the spider is often disguised as the fly." In 1918, Lenin said: "At this moment, when we occupy a firm position in Russia but have not the strength for the fight against international imperialism, we can have only one policy: it is the policy of tacking."

In 1935, Dimitrov, secretary general of the Comintern, declared: "We are sometimes accused of departing from our Communist principles. What stupidity! What blindness! We should not be Marxist and Leninist and revolutionaries, nor disciples of Marx, Engels, Lenin, and Stalin, if we were not capable of completely altering our tactics and our mode of action as circumstances may dictate; but all the deviations and all ins and outs of our tactics are directed to a single end—world revolution."

WHAT then is Stalin's policy? First, he reckons that the fierce competition and inherent antagonisms between the capitalist countries will end in their mutual destruction; therefore no means of setting them at loggerheads should be missed. In 1934 he said: "What came of the last war? They did not destroy Germany, but in Germany they sowed such a hatred for the victors and created such a rich soil for *revanche* that they have not been able to clean up the revolting mess they have made, even to this day, and will not perhaps be able to do so for some time. Instead, they got the smash-up of capitalism in Russia, the victory of the proletariat in Russia, and, of course, the Soviet Union. What guarantee is there that the second imperialist war will produce better results than the first?"

In 1939 this policy remained unchanged. On August 24th of that year we read in *Pravda:* "The first imperialist war brought about a great economic debacle and misery and hunger among the people. A revolution alone was able to put an end to the war and to the economic collapse. . . . There is little reason to doubt that a second war . . . would result . . . in a revolution in a number of countries in Europe and Asia, and the overthrow of the governments of capitalists and landowners in these countries." An English writer, commenting on this, says: "If the *Pravda* should prove to be right in its prediction and revolutions were to occur in a number of countries, even assuming that such countries were enemies of the Allied Powers, the consequences would be catastrophic: Soviet republics would appear on the Rhine, in the Mediterranean and in the Far East."

Secondly, Stalin has no intention of entering the capitalist war on an organized military footing. On March 10, 1939, he said: "We must be careful not to allow our country to be involved in conflict by instigators of war who are used to getting other people to pull the chestnuts out of the fire for them," whilst Comrade Mekhlis, chief political commissar of the Red Army, declared: "The function of the Red Army is to carry out its internationalist obligations and to increase the number of Soviet republics." Then, a few days later, at Kiev, he exclaimed: "Stalin, the great helmsman, will guide the mighty invincible ship of the last decisive battle, to the storming of capitalism, to the world commune."

STALIN allied himself with Hitler, not because he loved National Socialism, but because he feared it, and because England had surrendered her initiative to Poland. He knew for certain that this surrender would lead to war—a war in which the Western world would in all probability destroy itself. Immediately after Poland's integrity was guaranteed, Dimitrov circulated the following statement to the Communist parties abroad: "The Soviet Government and the Comintern have . . . decided that it is best to hold aloof from the conflict, while remaining ready to interfere when the powers engaged therein are weakened by war, in the hope of securing a social revolution."

That Hitler welcomed the Soviet-German alliance, I doubt. But once the British guarantee to Poland was given, he had no choice but to accept it; because, without it, this guarantee meant that should war break out in Eastern Europe he would simultaneously be involved in war in Western Europe. He accepted the risk, knowing full well what Stalin's intention was, and because, so I am of opinion, he realized that in no circumstances other than a collapse of German morale would Stalin dare to face the German armies in the field. Further, such a collapse was unlikely because the chances were that his method of blockade would prove more effective than the Franco-British.

So far Stalin has done very well at small cost and with extraordinarily little abuse from the Allied Powers. Not only has he annexed a greater slice of Poland than that occupied by Germany, but he has gained military and naval control of the three Baltic States, and, as I write, it would appear that he also will establish his control over Finland. Potentially, this will bring the Soviet frontier in line with those of Sweden and Norway, and therefore toward the Atlantic, which cannot but perturb Great Britain.

Having emasculated Finland, what will Stalin next do? Though here we enter Guessland, it would appear that his wisest course will be to hold his hand until there is some assurance as to which side is likely to win this war.

Should it be the Allied Powers, then it would seem that it is to his advantage to let them win, because their means of winning it—the blockade—is the most certain instrument to create in Germany the very conditions which will engender Bolshevism. At least their victory cannot but help play into his hands, because directly Germany is swept by revolution, all he need do is to occupy that country and Sovietize it.

This would mean the extension of the U.S.S.R. to the Rhine and the creation of an autarchic state of such immense power and self-sufficiency that, if not at once, then in a brief period of time, the rest of Europe, including Great Britain, would be engulfed by it.

Should, however, it appear that Germany is likely to win, then it is true that Stalin can stay her victorious course by withholding supplies from her. Yet the effect of such a double-crossing of the alliance is not likely to produce a sudden collapse, and only such would prevent Hitler launching his legions against Russia. This Stalin fears most of all, because he knows that in the field one German is tactically (really administratively) worth five Russians.

There is, however, another reason which may prevent him antagonizing his ally. Should Great Britain be on the point of dissolution, is it likely that Japan, seeing the approaching end of British dominion in Asia, will be so considerate as to allow Russia to gather in the fruits of her collapse? Instead, will not she at once seize the Philippines and then, having deprived the United States of a naval base in the western Pacific, occupy Hongkong, the Dutch East Indies, French Indo-China, the Malay Peninsula, and advance into Burma and India?

I am, therefore, of opinion that Stalin's most profitable course is to aim at a Franco-British defeat and risk a German victory and, further, whilst the clinch in the West continues, to advance into Iraq, Iran, and Afghanistan and establish himself so firmly in those countries that, should Germany win the war, he can at once move into India and prevent the Japanese from occupying that country. It is, therefore, possible, before this war enters its final lap, that India and not the Western Front will become the decisive area of British action. If this be the case, since it is more important for Great Britain to preserve what she has than to create what her rulers apparently are set upon—namely, a nonautarchic world—she will be compelled to come to terms with Germany.

Be this as it may, this struggle, from whichever angle it is examined, is full of strangeness and contradiction. The sole thing certain is that it is a struggle between oceanic and continental power; yet who represents the second is still in doubt. Is it Germany or is it Russia? I will leave it to a very great soldier, who once fought both these countries, to answer this question. When at St. Helena, Napoleon said:

"Is not Russia the head of the Hydra, the Antæus of the fable, which can only be subdued by seizing it bodily and stifling it in the embrace? But where is the Hercules to be found? Should there arise an Emperor of Russia, valiant, impetuous, and intelligent, a tzar with a beard on his chin, Europe is his own. . . . When I am dead and gone my memory will be esteemed, and I will be revered in consequence of having foreseen and endeavored to put a stop to that which will yet take place. It will be revered when the barbarians of the North will possess Europe, which would never have happened had it not been for you [the English]."

Ordnance with the Cavalry

Field Service Problems in the First Cavalry Division

By Lieut. Col. Robert W. Daniels*

DISSERTATIONS on industrial mobilization and arsenal manufacture generally fill the bulk of the pages of ARMY ORDNANCE. At least they appear with considerably greater frequency than discussions of Ordnance operations in the field. The reason for this undoubtedly lies in the more scientific aspect and the enormity of the problems of armament production as a whole. But the need for meticulous attention to detail, which is the prime necessity in all aspects of ordnance, is no better exemplified than in servicing and inspecting weapons in the hands of troops, where the misfit of a firing pin or the error of a sight may spell tactical failure and loss of life, and possible defeat in battle.

If the present high standards of ordnance manufacture are ever relaxed to any appreciable extent in the interests of prompter mass production, the Field Service indeed will find its task heavier. Upon its careful scrutiny of minutiæ will depend, more than ever before, the satisfactory functioning of our arms in the field. It is perhaps for this reason that the editor of ARMY ORDNANCE has asked me to prepare this article, well aware as he is that the severest proving ground of all is the theater of operations. In the *use* of our arms are reverses met or successes won.

Because I have had some little experience with Cavalry ordnance, and because the problems and methods to be used are, in my opinion, distinctly different from those encountered in ordnance of the Infantry division, particularly the new triangular division, I am confining my remarks to the ordnance and ordnance service of the horse cavalry. But this is no *apologia* for the use or existence of the cavalry as an arm, although this justification does not appear difficult.

The recent effective use of cavalry by the Germans in Poland, in conjunction with mechanized vehicles, for cleaning-up operations, for entering places inaccessible to wheeled vehicles, for performing patrol duty quietly and quickly, for holding captured points, for serving often as the eyes of the tank crews—this example of the use of cavalry should be sufficient justification. Observation of our own Cavalry Division, tracking with ease through the hillocky and mountainous country of Texas, overgrown with yucca, greasewood and mesquite, in places where roads will never exist for generations to come; moving in wide envelopments, and digging in for a blast of concentrated fire power, should be sufficient to convince—if further conviction be necessary for the skeptical cavalry critic.

There always will be many places where soldiers must fight, but where trucks cannot take them. On foot they will become slow of movement—their marksmanship and morale reduced by weariness. When the need arises for a rapid envelopment in spacious country, there will be calls for the mounted men. Indeed, the horse is to the Southwest what the Finlanders' skis are to Finland—each factor being suited to its particular theater and each equally effective when properly handled.

Although the cavalryman and his horse are as inseparable as ever, he nevertheless has developed certain important departures from the old precepts, in keeping with the necessities of modern warfare. His attention has been brought more and more toward the technique of his weapons so that he relies upon them for their full value in fire power; his horse has become a transporting agency which gives him reliable and rapid flexibility in the use of this fire power. The increased importance of the functioning of his weapons lays correspondingly added stress on the ordnance service of the Cavalry Division.

IT is said that Plato once divided mankind, in so far as the knowledge of a thing is concerned, into three categories: first, those who talk and write about a thing (they know the least); next, those who make a thing (they know considerably more); lastly, those who use the thing (they know most about it). Granted that we may take important exceptions to this Platonic classification, nevertheless there are many instances and many applications in which this statement is quite true. The maker of armament who does not heed the advice of the user is neglecting untold opportunities. Thus the function of all field service, while primarily the care, inspection, and maintenance of ordnance, includes none the less the promulgation of ideas for armament improvement. The two must go hand in hand.

Because of the close interdependence of men and weapons, it is difficult to discuss the ordnance of the Cavalry Division without some reference to the functioning of the division itself. For without weapons the soldier is not a soldier. Although the old soldierly qualities of morale and discipline are still as necessary as ever in the distinction of the military unit from the mob, nevertheless it is more than ever his weapons that enable the soldier to accomplish the purposes for which he exists as a soldier.

From this interdependence, which is continually strengthened by the daily practice of the men in the division in the exercise of their weapons, there arise two responsibilities. One is perfection in the use of arms under varying circumstances of terrain, tactics, and weather. The other is proficiency in technical instruction in weapons, their inspection and repair, and their future improvement. It is this latter aspect with which we are chiefly concerned here.

It should be remembered that the Cavalry Division preserves the square organization of two brigades, each having two regiments. The entire artillery support is furnished by one regiment of horse artillery, which appears to be definitely insufficient. A reconnaissance squadron of armed vehicles (scout cars and, at present, some armored cars), a motorized squadron of Engineers, and certain headquarters, Signal, Ordnance, Medical, and Quartermaster troops complete the picture. All trains are motorized and each Cavalry regiment has a platoon of scout cars in its headquarters troop. Each

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This article is released for publication by the Chief of Ordnance, U. S. Army. Statements and opinions are to be understood as individual expressions of their author and not those of the Ordnance Department.

Wide World

75-MM. FIELD HOWITZERS IN ACTION IN SUPPORT OF THE CAVALRY

regiment also contains a heavy-weapons troop, which mans caliber .30 and caliber .50 machine guns, and 37-mm. guns or 60-mm. mortars. Each rifle troop at present is also equipped with eight so-called light (air-cooled) machine guns. The batteries of artillery are equipped with automatic rifles for antiaircraft use and such other close-defense tactics as might require them.

Each cavalry regiment has seven scout cars, and there are about twenty under the control of higher headquarters. These vehicles are so complete—armed, armored, and maneuverable—that commanders consider them the answer to their earnest prayers. The radio installation makes them especially valuable for use as unit command cars, and each regiment or brigade uses one for that purpose. The armament of the Cavalry Division therefore presents a considerable variety, ranging from hand arms up to the 75-mm. field howitzer. Accessories, such as pack hangers, mounts, chests, and signal projectors add to this variety.

All this, except the armament for scout cars and trains, is either packed on or pulled by the horse. When the spirit and the dash of the horses now with the division are seen, some of the many problems of maintenance can be appreciated. After a rapid dash forward at the gallop, machine guns are in action within twenty or twenty-five seconds from the time of the halt, the horses being by that time well to the rear and under cover. The horse artillery gets off its first round in about the same time after dropping the trails. Consider the fact that the division is particularly suited to movement in rough terrain where no roads exist, in mountainous country where rocky footing is the rule, and in stretches covered with barbed mesquite and cactus, and the need, not only for rugged design and tough material, but also for continuous maintenance, becomes apparent.

For the field maintenance of all this equipment of the Cavalry Division, a light ordnance maintenance company is provided. This company is composed of five sections, with each section responsible for the work of its own specialty. Thus there is a small-arms section which handles pistols, rifles, machine guns, and their appurtenances, including pack equipment; an artillery section which handles all artillery matériel, including optical and fire-control equipment; an automotive section for the scout and armored cars, and a service section which performs various types of duties, mainly for the other sections; such as machine work, welding and brazing, carpentry, painting, etc. In addition to these, a headquarters and office section takes care of the management and interior economy of the company. When the division is operating by itself or, as it frequently must, at a great distance from the points of higher echelon supply, the company finds itself also performing the duties of ammunition supply—establishing distribution and control points. It also must perform the functions of supply of general ordnance and equipment in the absence of any other agency charged with this responsibility.

IN view of the fact that the personnel in the Ordnance company is not numerous (the authorized strength is thirty-six) it often becomes necessary, when the factors of the campaign require it, that men from one section coöperate in the duties of another. In a highly mobile situation, for instance, on terrain such as we have in Southwestern Texas, scout-car maintenance may become the all-important problem, so that half the personnel of the company may find itself repairing tires, dismounting and replacing steering assemblies, mounting new springs, charging batteries, or changing engines. On the other hand, if the division finds itself holding a defensive position for a considerable time, attention to arms maintenance may overshadow the vehicular maintenance and require a similarly large percentage of the personnel. It is important that the training of the company take into account this inevitable situation.

With regard to the manner of field maintenance, there

Wide World

High Speed Transport for Guns and Ammunition over Difficult Terrain

have been expressed, from time to time, various opinions to the effect that maintenance in the field should concern itself only with replacement; that is, with replacement of parts which have been broken or otherwise rendered unserviceable or with replacement of major items themselves when necessary; and that repair jobs involving machine tools and welding equipment should not be attempted in the field.

This means that the technical equipment of the maintenance company should consist only of a supply of spare parts and spare items properly balanced as to variety and quantity so as to meet the needs of maintenance. Experience shows this opinion to be definitely wrong in so far as the Cavalry is concerned. The reason is simple: there are too many articles involved, and there is no accurate manner of foretelling just what will be needed. As a consequence, bearing in mind that a scout car with, let us say, a broken crankcase is just as useless as if it had been blown up, the stockage of material necessary to insure maintenance by this method would equal almost, if not exactly, an entire duplicate supply of the division's ordnance. The weight of this material has been computed variously at from twenty-five to eighty tons.

On the other hand, many repair jobs can be done by the skilled mechanics of the company provided a small amount of raw material and a few portable machines are at hand: a milling machine with an ample variety of cutters for carriage and gun-mount parts; a lathe for rods and special screws; a drill and grinder for certain jobs. These, aided by a well-selected set of hand tools, taps and dies, and the ever-useful welding equipment, will assure that unlooked for breakages can be repaired with a minimum of down time.

It is, of course, in the interest of economy of time and labor to supply parts for all items which have a certain rate of wear or a susceptibility to loss or breakage. Rifle stocks, sear springs, machine-gun packings are typical samples. They can be installed quickly, and the down time is thus reduced.

All ranks must be imbued with the importance of this idea; namely, of getting the jobs done well and the items back to the troops with the least possible down time. The ratio of down time to time in service is one of the most important factors in the efficiency of the division. This ratio we watch carefully. To keep it low requires something in addition to technique. This something is organization and method of procedure. It might be called the tactics of ordnance maintenance.

IT will be noted that an important characteristic of the Cavalry Division is its ability to travel across country without roads. It is astonishing to see in what a short time the whole division can move out of an area, leaving not a trace of man, animal, or vehicle. Another feature which devolves from this is that the division is most likely to be employed at considerable distances from corps and army troops and from corps and army points of supply. Furthermore, these considerable distances may be over roadless country, such as is found in the great spaces of the Southwest.

These characteristics of the division—its tactical maneuverability and its use at a distance from other troops, must have fundamental influences on the organization for ordnance maintenance. In the first place, it must make for a closer attachment of the ordnance service. We have experienced instances when the two brigades of the division have been separated as much as thirty miles—one or both of them being engaged in a flanking maneuver. The country between has invariably offered, in the way of roads, nothing more than an occasional dirt trail. If the complete ordnance service is at some rear echelon when a scout car breaks an axle or a tie rod in the middle of the night and needs a welding job done promptly, the loss of time in getting the proper equipment and proper personnel to the right spot is only too obvious. Over the terrain in West Texas a truck may do well if it averages five or six miles an hour—if it does not get stuck. This speed is about that of the horse.

Wide World

CAVALRYMEN FIRING A 37-MM. GUN ON PACK MOUNT

The solution of this aspect of maintenance therefore, particularly as it applies to scout cars and similar vehicles, lies in the divisibility of the Ordnance company's equipment. For example, if a brigade or lesser unit of sufficient size is about to be detached from the division, one truck with welding equipment, a drill press, a small supply of automotive parts, and about three men may at once be detailed to accompany the brigade closely, attaching itself to the brigade headquarters troop or similar organization for administrative and tactical instructions and for rations. This truck then will always be close to the troops it is to serve, will be in friendly company in case of trouble, and cannot very well become lost. When the brigade rejoins the division, this detached section of the Ordnance company rejoins the company but otherwise remains in readiness for further attachment. This method has been tried with marked success.

THERE are two other functions of ordnance service with the Cavalry which remain to be described. They are supply of ammunition and supply of general ordnance. With regard to ammunition, it first must be remembered that there is no artillery ammunition train as such under the artillery commander. This function is performed by the division train under control of the division Ordnance officer. The lack of the artillery ammunition train, however, appears to produce no handicap, and, in fact, under the methods now used in the division, the expediting of the artillery ammunition supply appears to be accomplished very satisfactorily and undoubtedly with less expenditure of man power for handling the ammunition. The vital importance of ammunition to the artillery must be as thoroughly appreciated by the division Ordnance officer as it is by the artillery commander.

In practice, however, we often deliver ammunition by the division train directly to battery positions, or if the terrain prohibits this, then to some point in rear where the load may be transferred to caissons of the battery fifth sections. Thus the battalion combat trains of the artillery, which are motor vehicles, are more in the nature of a rolling reserve of ammunition under control at all times of the regimental commander for emergency use as necessary. In other words, the use by the combat trains to shuttle ammunition for regular supply need only be used to augment the division trains, since trucks from the division train obviously can negotiate the same type of terrain that a truck from the artillery can.

The avoidance of manhandling loads by this procedure has proved to be very gratifying to all ranks. The provision of ammunition for the brigades has proceeded, in general, in the orthodox manner, with the establishment of a distributing point for each brigade. Carrying small-arms ammunition farther forward to smaller units has not been found particularly necessary. In most cases it is out of the question because of terrain difficulties and exposure to enemy fire. Moreover, since the tonnages of these types of ammunition are small, the problem of distribution is easier.

In both these important aspects of ordnance supply—namely, the supply of automotive maintenance and of ammunition—the attitude of the ordnance service, if it is to be fully successful, must be one of bulldog tenacity. These services must not let the mounted troops get away from them, otherwise invaluable time may be lost. This point of view is important even in daytime operations in the Southwest country. The flat stretches of terrain contain hillocks and brush so thick that a regiment can be completely lost to the eye in a very few minutes. At night, this characteristic is increased immeasurably.

AS to the problem of supply of general ordnance, it is essential that certain quantities be carried. The reasons for this are similar to those mentioned above in connection with the close contact of the units by the Ordnance supply service, and because of the ready adaptability of the Cavalry Division to wide encircling movements. The old Field Service Regula-

tions' concept of the "independent cavalry" undoubtedly is as correct as ever in theaters in the Western Hemisphere, even though we scarcely ever hear the expression today. But with an arm of this sort, the supply services, including ordnance, must be complete. There will be times when issue and replacement of many an item will be critically necessary.

During the recent divisional maneuvers, these items were largely automotive tires, lubricants, cleaning materials, pack hangers, and the like. A certain amount of metal stock such as steel rods, aluminum flats, etc., was used by the mobile shop facilities in making repairs. In actual campaign, automatic rifles, pistols, and machine guns for prompt issue would certainly be highly desirable, considering the likelihood of matériel casualties from enemy action as well as the usual incidents responsible for breakage and loss which are bound to be significant in a large command on the move. In two weeks of exercises, a total weight of four tons of general ordnance supplies was handled by the light maintenance company, a small part of which was returned to post storage without having been used or issued.

The problem of anticipating just what supplies a division will need is inevitably the despair of those who are doing the planning, and I dare say it never can be solved perfectly. It is as difficult as foretelling the course of future events. But experience can go a long way in providing most of the supplies that will be found in need of replacement at some future date, depending, of course, on many such factors as time of year, location and nature of the terrain involved, combat capabilities of the enemy and—by no means least important—the state of training of the command itself. At any rate, this sort of supply is a sufficiently important function to require full-time attention of the supply section of the company whose duty it is to plan, store, transport, issue, and replenish.

So much for the more general aspects of administrative functions and organization. During the October 1939 maneuvers the important things were the details. Details are, after all, the essentials in all ordnance service. The sum total of ordnance is only a total of its details, and if these are not handled with meticulous care the sum total loses its effectiveness—often with disastrous results. As mentioned above, there often have been differences of opinion as to ordnance-maintenance problems revolving about whether all maintenance should be a matter of replacement in the field—such replacement varying from triggers, sights, etc., up to complete replacements of major items, such as the scout car or field piece. An argument on the other side has stated that in order to carry all replacements, parts, etc., necessary to forestall any eventuality, an exorbitant supply tonnage would be necessary. Proponents of this argument have insisted that machine tools and raw-material stock should be on hand in order to provide much greater flexibility regarding items, even at the obvious expense of undue time and labor required for field work in contrast with the more efficient means of arsenal and similar manufacture.

These two views, of course, represent the extreme. Experience, both in garrison and in the field, points definitely to the fact that the proper solution lies somewhere between. As to the Cavalry, with its considerable multiplicity and inevitable rough usage of equipment, the solution tends to lie closer to the machine-tool argument than to the argument invoking supply of parts. For instance, pack hangers which had been rolled upon by a pack horse, readily were repaired in a few minutes by aluminum welding. Broken axles on scout cars driven by overzealous drivers were welded satisfactorily. A thoroughly smashed crankcase on a scout car was patched into very serviceable condition by the use of flat aluminum stock in the same way. One of the heavy tire-spreading machines was rendered unserviceable as a result of the accidental bending of the main screw. The stress on this screw becomes considerable when in use and it does not function unless perfectly straight. A piece of steel bar was put on the mobile lathe and in a few hours a complete new screw was turned out. On the other hand, parts like steering knuckles or trunnion sockets for the armored cars are difficult to make in the field and must be carried as items in the general supply.

Repair jobs also can be done satisfactorily on machine-gun mounts, antitank-gun mounts and field-howitzer mounts, but in general most of the vital components of these weapons, such as triggers, extractors, sight parts, etc., must be carried in the spares. It is, of course, possible to turn out with the fairly complete machine equipment many of the parts pertaining to this category which will function satisfactorily for a time. But the difficulty of having the proper steel available and of giving it the required heat treatment, often militates against a permanent replacement in the field.

In garrison, the maintenance duties are added to by the requirements of inspection, and it is here, principally, that the promulgation of new ideas takes place. Many of these ideas seemingly are of small importance but actually, when incorporated into authorized changes, may mean the difference between satisfactory performance and breakdown. A bracket here or there may show need for a stronger rib or heavier fillet. A combat vehicle in continuous use may reveal inherent weakness in its axle housing, as indicated in early stages by difficulty in steering. The camber is then measured, the exact spot of the weakness located, and the entire situation corrected accordingly by appropriate means. Tendencies toward malfunctioning in automatic weapons may be tendencies only when the weapon is new, but these can become problems after the weapon has seen a long stretch of service. Such improvements must be incorporated into new manufacture either as changes in design or in material, or both.

Thus it can be seen that ordnance field service is a combination of a number of things—job shop, retail supply house, garage, and laboratory. And if the personnel within it are selected for their proclivities for these types of work and then trained well and arduously, there will be every expectancy of success during the real test of a campaign.

EDITOR'S NOTE.—This is the first of a series of articles to be published in these pages dealing with Field Service problems of ordnance maintenance and supply. Now that sufficient time has elapsed for trial and experimentation with the new divisional organization—triangular, streamlined, or whatever it is to be designated—it is to be hoped that officers of experience in this sphere will use the pages of this journal for constructive analyses of the expectations and results obtained from the new formation.

Coequal with the problem of producing ordnance in quantity in war time is the problem of supplying it and maintaining the many complex items of ordnance equipment in storage and in the hands of troops. As the latter problem is analyzed in the light of current developments, the production problem will be more intelligently understood by all.

Our Steel Industry and Defense

Research and Development Depend upon Adequate Profits

By T. M. Girdler*

I TAKE this opportunity, first of all, to present my personal felicitations to General Wesson whose record as Chief of Ordnance already has distinguished him and his Department among the ranks of American industry throughout the land. The country is fortunate in having in its service men like General Wesson. We have heard from his lips of the coöperation which industry gives the Ordnance Department. But that coöperation is not one-sided: General Wesson and his associates also give it to industry in full measure.

It is that kind of coöperation which gives us new faith in the workings of democracy. Because of it there never will be any need for regimentation to accomplish the task of providing for our national defense. We have in the cordial and coöperative relations betwen the Ordnance Department and industry a concrete example of industry and government working harmoniously together in the interest of the nation as a whole. We have here proof that a commendable spirit of splendid coöperation between industry and the Government is possible.

I believe we have another cause for gratitude tonight in that the discussion has turned upon the word "defense." No one here tonight or, I believe, anywhere else in the country, is talking about "aggression." The overwhelming majority of people not only are opposed to any aggression, but they are opposed to our participation in the European war under any circumstances now predictable.

To my mind, one of the most interesting and significant portents in this country is the unison with which people of all parties, all creeds, and all walks of life, have united in saying, "The United States must keep out of this war." We have a country in which there is great divergence of opinion upon many domestic issues. And yet, when it comes to the vital question of war, all these people who consistently disagree among themselves, with that liberty peculiar to this country, unite in one common voice and say, "We want no part in this European war."

But at the same time, all these various groups are equally emphatic in their common stand on behalf of adequate national defense. In building up our national defense there can be progress and accomplishment only on a basis of coöperation such as exists between industry and the Ordnance Department.

Many industries are giving such coöperation, but quite naturally I am most familiar with the experience of the steel industry in its relations with the Department. Those relations reached their greatest degree of intensity during the World War and they have continued with less intensity, but with the same harmony in the succeeding years.

With respect to the industry's participation in the World War, I would like to quote from the final report of the chairman of the United States War Industries Board submitted to the President of the United States in February 1919. Discussing the iron and steel industry, the report states:

"The steel division" (created in November 1917 with J. Leonard Replogle as director of steel supply and Frank Purnell as assistant director) "wishes to take this opportunity of recording the great assistance rendered by the American Iron and Steel Institute. E. H. Gary, as chairman, appointed a committee on steel distribution, through which the director of steel supply distributed to the various mills in the country the orders for war materials received from the various departments of our own Government and from the Allies. Commercialism was entirely dropped from their calculation and they entered patriotically into their work with no thought of personal gain but entirely for the interest of our common cause."

SINCE the war, the steel industry has continued its coöperation with our national-defense forces. The industry has ever remained in close contact with the Army and Navy Munitions Board. The industry, as such, and every major component of it has participated in the studies and plans for industrial mobilization as they apply to the steel industry. The American Iron and Steel Institute ever has remained in closest contact with Army and Navy officials to the end that the entire strength and power of the industry may be readily available for any emergency.

These continuous contacts have been indispensable, particularly in view of the increasing importance of steel as a factor in national defense. Horse cavalry which was still in use during the World War has been supplanted in large degree by mechanized cavalry which rides on steeds of steel. The modern high-speed tanks are possible only because of advances in steel technology—in their engines, their armor, their armaments. The greater range and longer life of modern artillery have been made possible by tougher, finer, stronger steels. In every phase of warfare, the advances in offensive power and defensive strength are due primarily to the greater use of better steels.

Infantry is rushed to the front by motor transport made possible by steel. In the air, steel today plays a far more important part in airplane construction than during the World War—greater strength making possible higher speeds and greater efficiency in attack and defense. The fact is that on land, in the air, and on the sea, every phase of national defense is dependent on steel. The development of the steels to meet these requirements has meant time, patience, and the expenditure of millions of dollars in peace-time research.

During the last war, the making of special steels for airplane requirements was a very serious proposition. It was undertaken hastily during the stress of emergency. Much was accomplished in haste—but the problem was not satisfactorily solved at that time. With the advent of peace, research and experimentation in aircraft steels continued. This work was spurred on by the need of better aircraft for peace-time purposes; yet it was more than ten years after the Armistice

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This is an address delivered at the 1939 dinner meeting of the New York Post, Army Ordnance Association, the Roosevelt Hotel, New York City. The dinner was in honor of Maj. Gen. C. M. Wesson, Chief of Ordnance, U. S. Army.

before the problem of special steels for aircraft was solved satisfactorily. Today, the men who make steel know "what it takes" as far as aircraft steels are concerned—but they have had twenty years in which to find it out.

In the last war, welded construction was undertaken in an experimental way. It showed possibilities; but in spite of the pressure of emergency needs, these possibilities were not fully realized. Now, at the end of twenty years, welded construction has been proved definitely feasible along many lines which were only experimental at the time the Armistice was signed. But again, I say, the experimenters have had twenty years to perfect their technique.

These are only a few instances of many that might be cited, but they serve to emphasize the fact that research and invention, which lead to great advances in the art of adapting steel to special purposes, are not accomplished overnight. Time is needed. No matter how brilliant may be the research men and the engineers of industry, the nature of the materials with which they work and the jobs which those materials are expected to do are such that of necessity time must elapse between the development of an idea and the resolution of that idea into practical performance.

These advances and numerous others are of great practical importance in our national defense today. Some of them were developed with the coöperation of the Ordnance Department to meet specific armament needs. But, basically, practically all of them were developed in the course of the normal and regular conduct of American industry, seeking to make a profit under a competitive system in a free country. They were financed out of the operating profits which American industry contrived to make in the face of all the economic upheavals which have swept over this country in the last twenty years.

RESEARCH and invention, which lead to special developments adaptable to national defense, require large investments. The research and development of today—which must be paid for today—represent an investment in the markets of tomorrow. In other words, a certain share of today's profits—if any—must be plowed back into research and invention if we are to have the type of progress which will represent, in tomorrow's emergency, the needed contribution to defense.

I wish particularly to emphasize this point because, in these days, in some quarters it seems to have become almost a sin to earn a profit. And yet the profit motivation—the desire and the opportunity to make a profit in the face of competition—has been the mainspring of progressive development of inventions and processes in this country since the nation began. Today's assurances of an adequate national defense are in fact to no small extent founded upon industry's continuing opportunity to earn the profits which are needed to finance research, invention, and development.

A prosperous industry and a sound economy are vital factors in the national defense. There is no need for me to describe here the demands that would be placed upon industry and upon our financial system should fate involve the United States in armed conflict with another nation. National defense in its modern definition is not merely a matter of man power. It involves economic power. It involves machine power. It involves supplies of essential materials.

Now, lest I be misunderstood, there is one point I wish to make doubly plain. When I speak of the necessity of maintaining the opportunity for profits under the competitive system, I most emphatically am not referring to war profiteering. The demagogues who rant of war profiteering in the steel industry seldom discuss the actual conditions with respect to the prices of steel for war purposes which obtained during the World War. I presume that most of the American people today are under the impression that the steel industry made inordinate profits out of Government war orders.

As most informed persons know, we had an excess-profits tax at that time under which the Government took a very large share of any profits that were made. But that is only a very small part of the story. The important fact, which I hope has not been entirely forgotten today, is that during the last World War the prices of steel were worked out by coöperation between the Government and the industry on levels far below those prevailing in the open market.

Remember there was no legal authority for this procedure. There was no law under which the Government could regulate prices. The reduction of steel prices for war purposes was a voluntary move on the part of the industry. It was a typical instance of the manner in which people in all walks of life coöperated with the Government in time of emergency. The extent of this coöperation is illustrated by a section of the War Industries Board report dealing with prices:

"Such prices were fixed on bases which were fair both to the manufacturer and the Government. These prices constituted a very drastic reduction from the prevailing market prices. . . . It has been figured that this reduction meant a saving to the United States and allied governments of approximately $3,000,000,000, and in view of the fact that there was no legal authority for enforcing these requirements, we considered it a great achievement and a wonderful evidence of the patriotism of the steel manufacturers in this country."

IN the present period of world emergency, which necessitates a speeding up of national defense, I am convinced that the steel industry and the other industries of this country stand ready to work out with the Government, just as was the case in the last war, ways and means of coöperation whereby the needs of national defense can be met, not on a basis of profits but on a basis of patriotism.

In conclusion, I repeat that those of us who represent industry have good cause to be happy for this opportunity to honor General Wesson. In the steel industry we feel, perhaps because of the basic character of steel, that our relationships with General Wesson and with the Ordnance Department have been especially close. The Army and Navy are thoroughly familiar with modern steel practice both in industry and in arsenals and navy yards. I mention especially the fine metallurgical research which has been conducted through many years at the Watertown Arsenal, Watertown, Mass.; the technological progress in the manufacture of guns at the Army's gun factory at Watervliet, N. Y., and at the Naval Gun Factory at Washington, D. C., and the excellent work done by the Frankford Arsenal at Philadelphia.

General Wesson has spent much of his distinguished career in close contact with steel developments. He was stationed at the Watertown Arsenal for many years. He was in charge of the Aberdeen Proving Ground, Maryland, for eight years. In these offices he came to know the problems of the manufacturer and has always proved himself an understanding and broad-visioned administrator in protecting the interests of the Government and of private industry. In his hands the country can be assured the great task now before it will be well done.

Submarine Mines

Their Purpose, Characteristics, and Operation

By Capt. J. E. Harriman*

A MINE is basically an explosive charge, inclosed in a container, and a device for firing. Land mines have been used to great advantage in modern war, the most recently reported example being their ingenious and extensive use by the Finns in holding up the advance of the Russians.

However, it is the mine designed for use in waterways which I will discuss here. Of course, the explosive and the firing device of such a mine must be inclosed in a water-tight container. In earlier days, simple mines consisting merely of barrels or kegs containing gunpowder or other explosive, arranged to explode when struck by a ship, were used extensively.

Mines designed for use submerged in water are known as *submarine* mines. Except in very shallow waterways, a buoyant mine must be used. Originally, crude anchors, fastened to the mine by hempen ropes, were used to keep the buoyant mine beneath the surface of the water, but only by a distance which would insure contact with the hull of any vessel which might pass.

A floating mine is detected easily except in periods of fog or darkness and may be removed with relatively little difficulty by sweeping or countermining (exploding by some means which will not cause damage).

Of course, any mine is dangerous, but the submarine mine, which the mariner cannot see and avoid, is the most effective. A buoyant water-tight metallic mine case filled with explosive and containing a firing device is held beneath the surface by an anchor of suitable weight. Cables and fittings of noncorrosive metals have been substituted for the easily frayed and unreliable ropes of earlier days. Firing devices have been improved gradually, through years of development, to make explosion almost certain when contact with a vessel is obtained. It is impossible to describe in this article many of the interesting details of modern mine systems because of their secret or confidential nature. As in other technical developments, there has been a tendency to introduce complicated apparatus. Basic principles, however, remain unchanged, and the slogan, "Keep your apparatus simple," should be adhered to by all charged with development of this important element of national defense.

THERE are two main types of submarine mines: (1) controlled mines which are connected to the shore by an electric cable and which may be fired at the will of a commander on shore, and (2) uncontrolled mines which have no such connection to shore and which, when once planted, are a potential source of danger to friend and foe alike. Both types may be planted from vessels of various kinds. The mines layed by airplanes, of which we have read so much recently, are necessarily of the uncontrolled type only.

Preliminary to the most effective use of either uncontrolled or controlled mines, it is necessary to have some information concerning the water area to be mined. Depth of water, type of bottom, currents, tidal and storm conditions, and the general type of vessel the mines are to be used against, are among the more important matters which must be considered. If the bottom is relatively uniform and military conditions are such that soundings may be taken before the mines are planted, it is practicable to cut in advance the mooring cables, used to attach each mine to its anchor, to lengths which will insure the proper submergence when the mines are planted. The size of mine to be used depends on the type of vessel against which it is to be employed. Of course a larger mine is necessary for effective use against a battleship than would be required for protection against unarmored or lightly armored vessels only. Mine cases of various shapes are used. The most common is spherical, although spherocylindrical cases are often employed. The weight of the anchor to be used is determined by the size of the mine, currents, and tidal and storm conditions.

The tide is a very important factor in all mine work. In some water areas where tidal changes are very great, it is necessary to plant mines at different levels to insure the desired submergence at all times. Experiments with apparatus designed to move the mine up and down with the tide have indicated that such equipment would be so complicated as to be unreliable and uneconomical.

When conditions are such that it is impracticable to take soundings and where the bottom is very uneven, automatic anchors are used. These are relatively simple in operation and insure that the mine will be submerged below the level of the water a predetermined distance. This is accomplished by setting a device inside the anchor and the use of a plummet attached to the device by a line, the free length of which may be varied in accordance with the amount of submergence desired. In one type of automatic anchor, the mine floats on being planted, and the anchor cable pays out automatically until the plummet (which is dropped a fraction of a second ahead of the mine and anchor) strikes the bottom. This causes the anchor cable to stop paying out and the mine is carried under the surface by the predetermined distance equal to the length of the line used to attach the plummet to the anchor mechanism.

In some modern mines—both controlled and uncontrolled—it is not necessary for the ship to come in contact with the mine case in order to detonate the explosive charge. The firing device may be set off by contact with the mooring cable or with antennae which float upward from the mine case.

Uncontrolled mines, in the United States, are handled by the Navy which also has charge of mine-sweeping operations. The Coast Artillery Corps of the United States Army is charged with the development, procurement, upkeep, planting, and firing of such controlled submarine mines as are included in the scheme of defense of the continental United States and our overseas possessions.

Unlike the uncontrolled mines which fire whenever contact with an object is made and menace both hostile and friendly vessels, the controlled mines may be fired or not at

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the will of the commander on shore. A friendly fleet may be passed through a controlled mine field with perfect safety and the mines then may be set from shore to fire should a hostile fleet attempt to follow. Or the controlled mine field may be set for *delayed-contact* fire and will signal the control station on shore when a mine is struck, indicating the presence of a vessel. If the vessel is one which should be destroyed, the mine may be fired at once; or firing may be delayed for any desired period or withheld entirely if it is a vessel which should not be sunk. Thus the controlled mine system is also a valuable intelligence agency which will signal the shore if vessels should enter the planted fields. In some situations during fog or when other conditions of low visibility exist, it is conceivable that this might be the only warning received of the presence of raiding vessels.

IN some systems of controlled submarine mines, incoming vessels are tracked by observers on shore and their positions plotted at frequent intervals. The location of each mine is charted carefully at the time of planting and is known to the operators of the shore control station. When a hostile vessel arrives over the mine field, the nearest mine may be fired by closing a switch on shore which completes an electrical circuit to the mine. Thus the vessel may be destroyed without making any physical contact with the mine. Firing by *observation*, as this method is known, is, of course, limited to periods in which visibility is sufficiently good to permit tracking the incoming vessel.

Thus the commander charged with the defense of a harbor protected by certain systems of controlled submarine mines has three methods of firing. Should the situation be such that the protected channel must be completely closed for a period and that no vessels of any description be permitted to pass, the system may be set for *contact* fire, and the mine will explode as soon as a vessel comes in contact with it. The action of the mine is then similar to that of the uncontrolled mine, except that the firing is accomplished by an electric current supplied automatically from shore through the cable circuit. It has advantages over the uncontrolled mine in that the defense commander is notified instantly and automatically of the fact that a mine has fired and *which one*. Change to one of the other methods of fire then may be made at the will of the commander.

Delayed-contact fire is the method perhaps applicable to more situations than either observation fire or contact fire. The system is set to signal the shore station when a mine is struck and indicates which mine it is. In many cases the vessel involved may be observed and identified. It may not be desirable to sink it in that part of the channel, or the vessel may be of such minor importance as not to warrant disclosing the presence and location of the mine field. In such situations, the mine need not be fired.

Regardless of the method of operation or type of fire employed, the great advantage of a controlled mine field is that it permits the safe passage of friendly vessels. However, should such vessels pass directly over the mine field at frequent intervals, much damage would result and the problem of maintenance would be greatly increased. Hence controlled mines usually are planted in groups, the mines of each group being arranged approximately in a straight line and the groups staggered to permit the piloting of friendly navigation on an irregular course through the field without striking any of the mines, cables, or moorings. However, many other patterns have been employed in the past and undoubtedly will be employed in the future. It has been customary to plant no fewer than seven mines in a single group and a greater number usually is employed. The number in each group is determined by the type of control apparatus on shore and the type of electrical cable used to connect the mines to the shore station.

In the earlier systems, a separate metallic circuit was provided from the control station on shore to each mine in the group. This was accomplished by laying a multiple-conductor cable from the shore station to a point centrally located with respect to the group of mines. The number of conductors in the shore cable, as it is commonly called, corresponded to the number of mines to be planted in a single group. The sea end of this cable terminated in a water-tight container known as a distribution box, and individual single-conductor cables were run between this box and each mine. The multiple-conductor cable required was difficult to procure, expensive, and relatively short-lived. Whenever one of the mine conductors became short-circuited, it was necessary to replace the cable or have that mine inoperative. Except for the difficulty in obtaining multiple-conductor cable which will stand up under service conditions and not be prohibitive in cost, this system was and still is reliable and effective.

A few years ago, experiments conducted by military personnel on duty at the Coast Artillery Corps' Submarine Mine Depot, at Fort Monroe, Va., established that a controlled mine system using a single-conductor submarine mine cable to connect each group of mines to the shore control station, instead of the costly and unreliable multiple-conductor cable, was practicable. The initial arrangement of control equipment for such a system was developed in 1926 and standardized in 1927, largely through the genius of the late Master Sgt. Paul R. Nelson of the Coast Artillery Corps. Progress since has been rapid, and several improved and simplified systems have been developed in recent years.

Research and development work is centered in the Submarine Mine Depot and is carried on largely by military personnel selected for this important work by the Chief of Coast Artillery. The present Chief, Maj. Gen. Archibald H. Sunderland, is himself an expert on all matters relating to submarine mines and gives personal attention to the improvement and simplification of our system of controlled mines.

An arrangement of selectors is the heart of any system of controlled mines which utilizes only one conductor to serve a group of several mines. There are many types of selectors which may be employed. Some utilize the principle of the automatic telephone while others are adaptations of apparatus used in railway signal devices. In the single-conductor system, as in the multiple-conductor system, the electric cable from shore terminates in a distribution box near the center of the group and connection to the individual mines is made by short lengths of submarine cable. In the single-conductor system, selector apparatus is included in the distribution box.

I WILL touch only briefly on the planting of controlled mine fields. A suitable planting vessel is, of course, essential, the Army's newest and most efficient being the ELLERY W. NILES now stationed in the Panama Canal Department. This ship is named for a distinguished officer. Army mine planters also are stationed in other important harbors. They are operated entirely by military personnel of the Coast Artillery Corps. The planting of a mine field requires great navigational skill,

and the warrant officers of the United States Army Mine Planter Service who handle the planting vessels are experts. The preparation of the mines, anchors, mooring cables, electrical cables, junction and distribution boxes, and other equipment needed for planting controlled mines is the duty of mine batteries of Regular Army Coast Artillery harbor-defense regiments. These batteries perform all functions connected with the planting, operation, maintenance and taking up of the controlled mine fields, except the navigation and operation of the mine planters. They operate the several small launches needed to assist in the planting and make the necessary water-tight electrical connections. An extremely high degree of coördinated training is necessary for efficient planting. The personnel of these mine batteries also operate the electrical apparatus pertaining to the control stations on shore and the observing and plotting stations pertaining to the mine fields. The operations required to plant a group of controlled submarine mines are illustrated on pages 309 to 316.

Mines are effective only as long as they remain in a position which will threaten hostile navigation. They may be removed by sweeping operations which, if attempted, usually are conducted with auxiliary naval vessels. They also may be removed by countermining, which may be accomplished by gunfire, depth charges, or other means, dependent on the type of mine. To prevent hostile sweeping or countermining operations, it is necessary that the mine field be protected by rapid-fire batteries of artillery, so located as to keep hostile vessels from entering the field. This is not always possible in the case of uncontrolled mines, which are planted frequently beyond the range of protecting shore batteries. However, as controlled mine fields usually are planted only to cover the approaches of important harbors and seldom farther from shore than seven or eight miles, the needed protecting fire of shore batteries can and should be provided.

THAT submarine mines are of an inestimable value in the defense of any area is an established fact. One has only to glance at the headlines of any current newspaper to be convinced of their effectiveness. The press has attributed to mines the loss of as many as nine ships in a single day within the confines of the Thames estuary alone.

The mere suspicion that a waterway may be mined has a deterrent effect on a hostile naval commander who may wish to traverse that area with his ships. Suspecting mines, he may sail away entirely, in which case the defensive battle is won, or he may say, like Farragut, "Damn the torpedoes, go ahead"—and probably lose some of his ships.* We know that a German submarine commander took his ship into Scapa Flow and fired torpedo after torpedo at the anchored Royal Oak until he was sure she was sinking. He then retraced his course possibly through hostile and friendly mine fields to a royal reception in Germany for himself and his crew. A few weeks later a second submarine commander is reported to have entered the Firth of Forth and to have seriously injured one of Britain's newer cruisers by torpedo fire. It is rumored that this commander, too, got home safely. More recently we have read of the daring action of a British submarine in proceeding to the mouth of the Elbe and inflicting great damage.

We do not know whether these intrepid commanders encountered hostile mine fields, nor do we know how many failed in similar attempts. We do know, however, that at the time of this writing no reports have appeared in the public press which would indicate that hostile naval vessels other than raiding submarines have attempted to approach either the Firth of Forth or Helgoland. The threat of controlled or uncontrolled mines may be the answer in these areas.

As to the future of mines, it can be said that history has established their great destructive effect when properly used. They still are feared by mariners—naval commanders and captains of merchant ships alike. Except for the occasional daring raider who may, through skill and good fortune, elude the defending mines, great losses may be expected by the hostile commander who takes his vessel through waters protected by an intelligently planned and carefully laid field of modern mines.

Editor's Note.—Two of the newer developments in connection with submarine mines are the suggested methods of planting mines from airplanes, the practicability of which is open to question, and the extensive use of uncontrolled mines. Competent opinion seems to be divided on both subjects. Obviously, the controlled mines referred to in Captain Harriman's text are not susceptible of being planted from an airplane. These mines weigh some 300 pounds and the anchors approximate 200 pounds. While weight is not a governing factor, proper handling of the controls offers quite difficult aircraft problems. Allied to this subject, but of an entirely different category, is the method of launching torpedoes from aircraft. Considerable accuracy in this form of attack can be developed. Thus it is possible to launch a torpedo from an airplane as far as half a mile from the target while flying at extremely low altitude, say fifty feet. About half a minute would be required for the torpedo to travel from its point of release to the target—entirely too short an interval for a merchant or naval vessel to alter its course sufficiently to escape the torpedo. Consequently this is a prospect of torpedo, if not of submarine mine, development and application.

On the subject of uncontrolled mines little definite information is available for publication. Uncontrolled mines are not always held at a fixed position in depth. According to John Hays Hammond, Jr., inventor of many devices for use in naval warfare, in a recent United Press dispatch, such types of uncontrolled mines were developed during the World War. He described the Leon mine of that period which was a device containing 300 pounds of TNT. The device is slightly heavier than its own displacement. It is designed so that in the water it sinks slowly to a predetermined depth where an automatic valve engages an electric motor, driving the mine back up to a certain depth. The valve switches off the motor and the mine starts down again. The cycle continues for the life of the batteries.

According to Hanson Baldwin, noted military and naval correspondent of the *New York Times,* antenna mines are probably being used in the North Sea mine fields. These are mines which can be located at any depth and from which long thin copper cables supported by small metal buoys reach up to within a few feet of the surface. This type of mine is set off when a submarine (or other metallic body) touches the antenna, thus making it unnecessary for a vessel to strike the mine itself. The number of mines required is also thus decreased. In no field has inventive genius been more prolific than in this fascinating direction. As in many other inventions, it can be assumed that the ratio of practicality is small.

*In Civil War days mines were commonly called torpedoes. The monitor Tecumseh was blown up by mines.

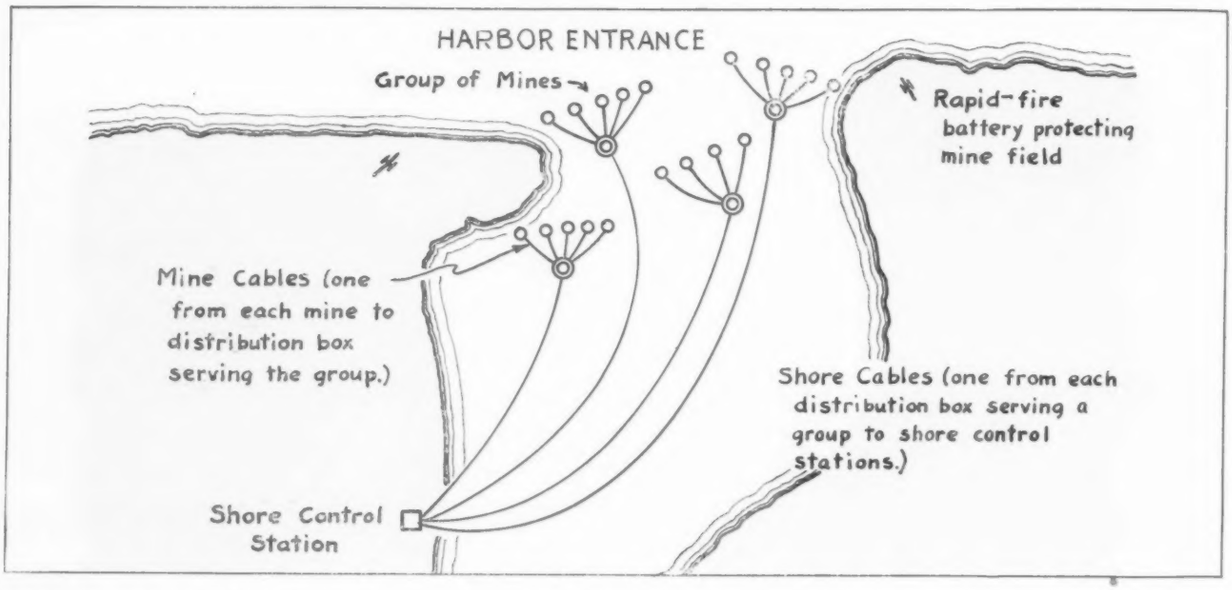
Underwater Defense

NAVAL aspects of the war now waging in Europe have brought the submarine mine forcibly to public attention. But among military and naval students the function of this important weapon is not new nor is its effectiveness under the rules of war unappreciated. Far from novel in warfare, either on land or at sea, the explosive mine in our own history has a lengthy record and at times a romantic atmosphere. By almost universal acknowledgement David Bushnell (1724-1826) of Connecticut is conceded the title of father of submarine mining. While a student at Yale, he discovered and developed the principle of attacking a ship by underwater explosion. Previously, all such attacks had been made at or above the ship's waterline. His researches were conducted from 1775 to 1785.

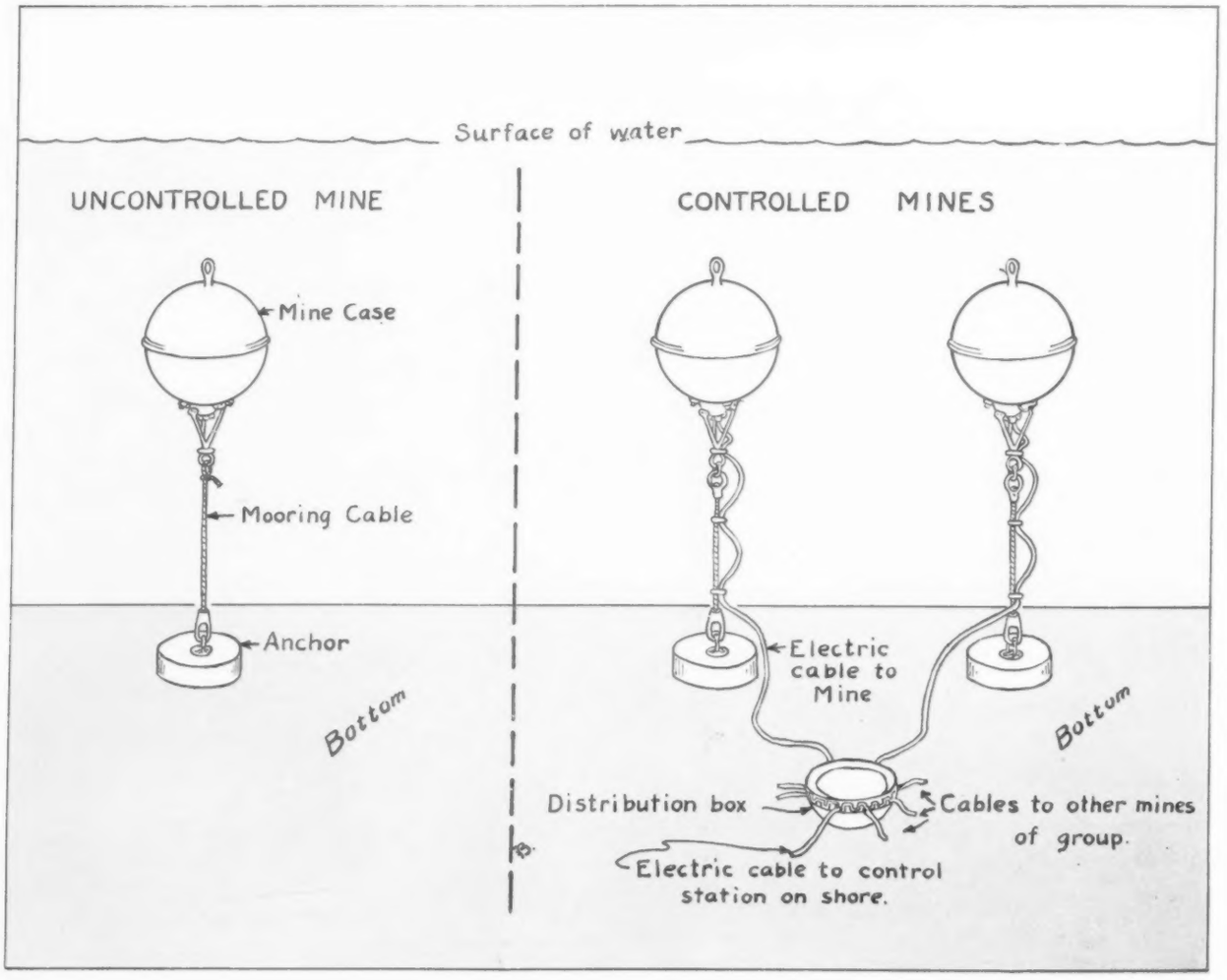
Twenty years later, Robert Fulton, of steamboat fame, devoted his attention to submarine mines. In 1801 he blew up a small vessel in the harbor at Brest, France. Later, he demonstrated his device to the Admiralty at London. In a letter to the Secretary of the United States Navy at the conclusion of his experiments and before devoting his attention to steam engineering, Robert Fulton wrote: "It is proved and admitted, first, that the waterproof locks will ignite gunpowder under water. Secondly, it is proved that 70 pounds of gunpowder exploded under the bottom of a vessel of 200 tons will blow her up; hence it is admitted that if a sufficient quantity—and which I believe need not be more than 200 pounds—be ignited under the bottom of a first-rate man-of-war, it would instantly destroy her. . . . With these immensely important principles proved and admitted, the question naturally occurs whether there be within the genius or inventive faculty of man the means of placing a torpedo under a ship in defiance of her powers of resistance. He who says there is not, and that consequently torpedoes can never be rendered useful, must of course believe that he has penetrated to the limits of man's inventive powers."

But the most colorful figure in submarine mine development was Col. Samuel Colt. In 1829 he developed the idea of utilizing an electric current for exploding a submarine mine. On July 4, 1842, he demolished an old gunboat in New York Harbor opposite Castle Garden. Aided by the Congress of the United States, which provided $17,000 to continue his researches, Colonel Colt, on April 13, 1843, destroyed a brig of 500 tons on the Potomac River at a distance of five miles while she was sailing at a rate of at least five knots. Congress adjourned to see his test! Since then, many advances have been made. Mines are controlled or free. Lately the magnetic mine, much veiled in secrecy, has made its appearance. On the following pages are pictured the method of laying a controlled mine field, a duty of the Coast Artillery Corps of our Army.

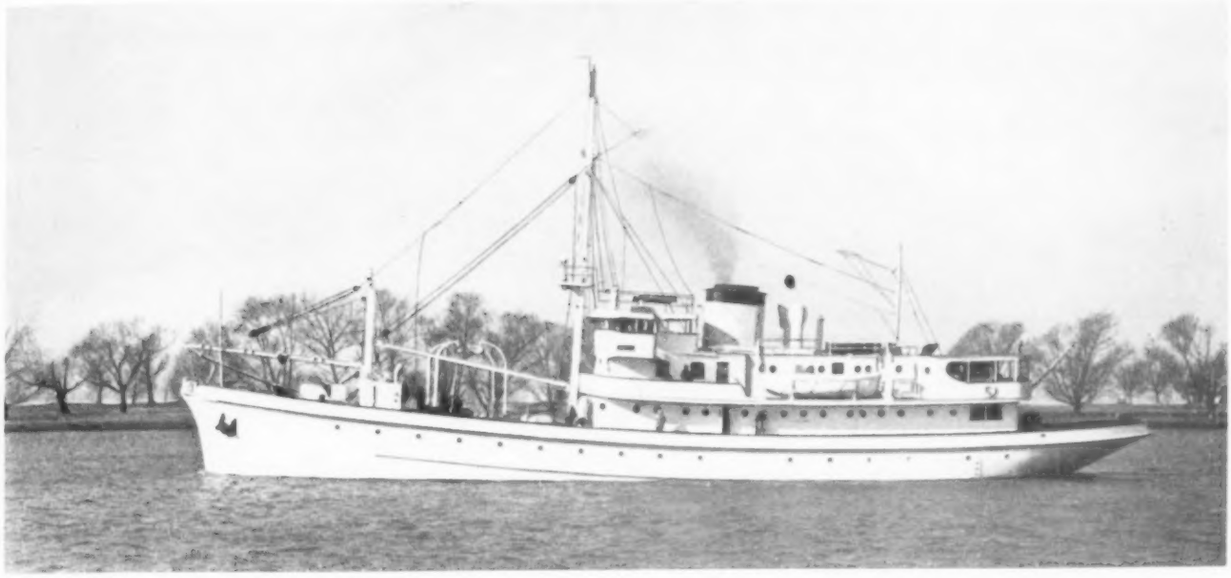
Mines for Coast Defense


HARBOR ENTRANCE
Group of Mines
Rapid-fire battery protecting mine field
Mine Cables (one from each mine to distribution box serving the group.)
Shore Cables (one from each distribution box serving a group to shore control stations.)
Shore Control Station

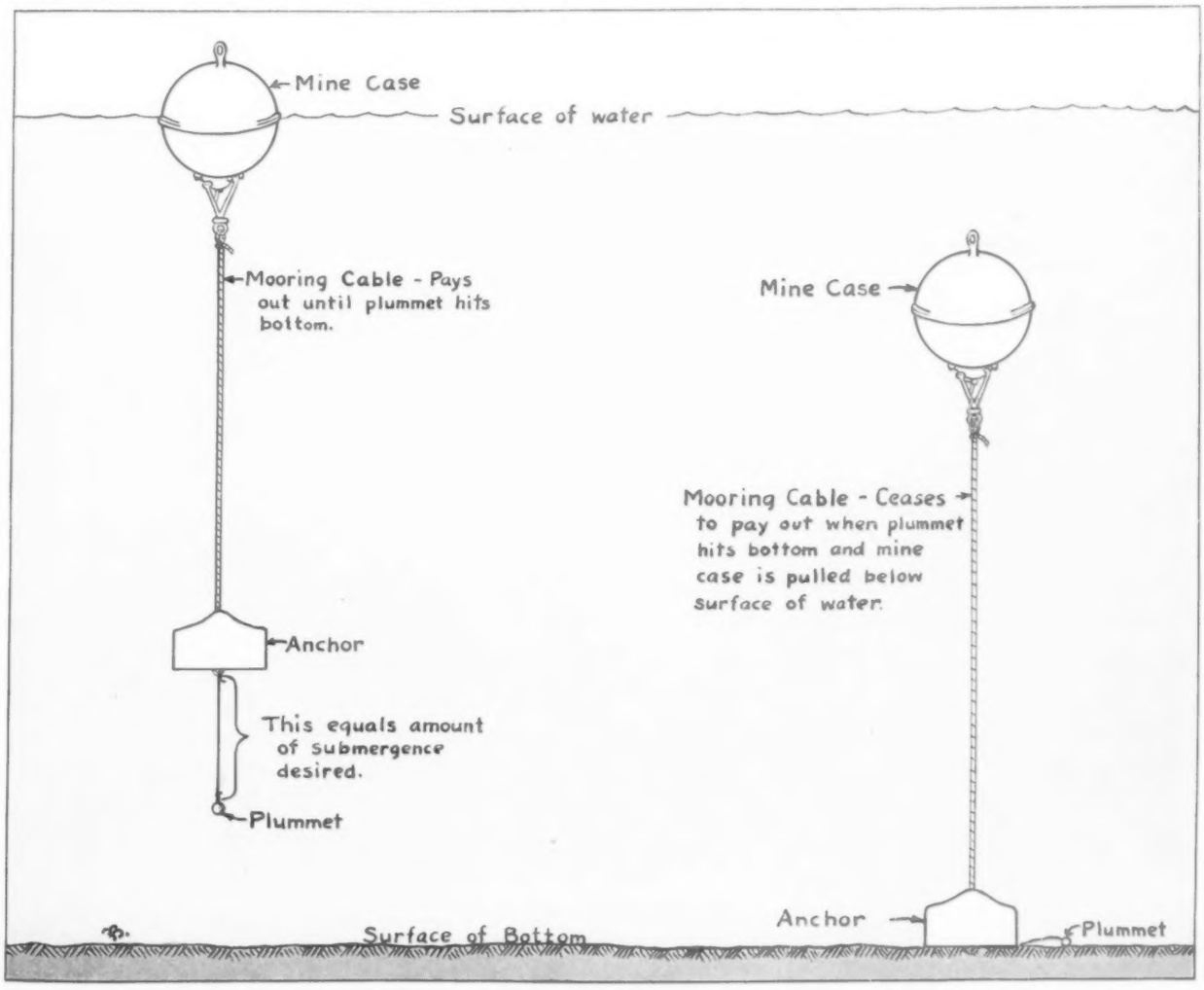
The diagram above shows an arrangement of controlled submarine mines for the defense of a harbor. Below are shown the two main types of submarine mines. The uncontrolled mine has no shore connection and fires upon contact. The controlled mine may be set from shore for direct-contact fire, delayed-contact fire, or may be fired by the observation method.



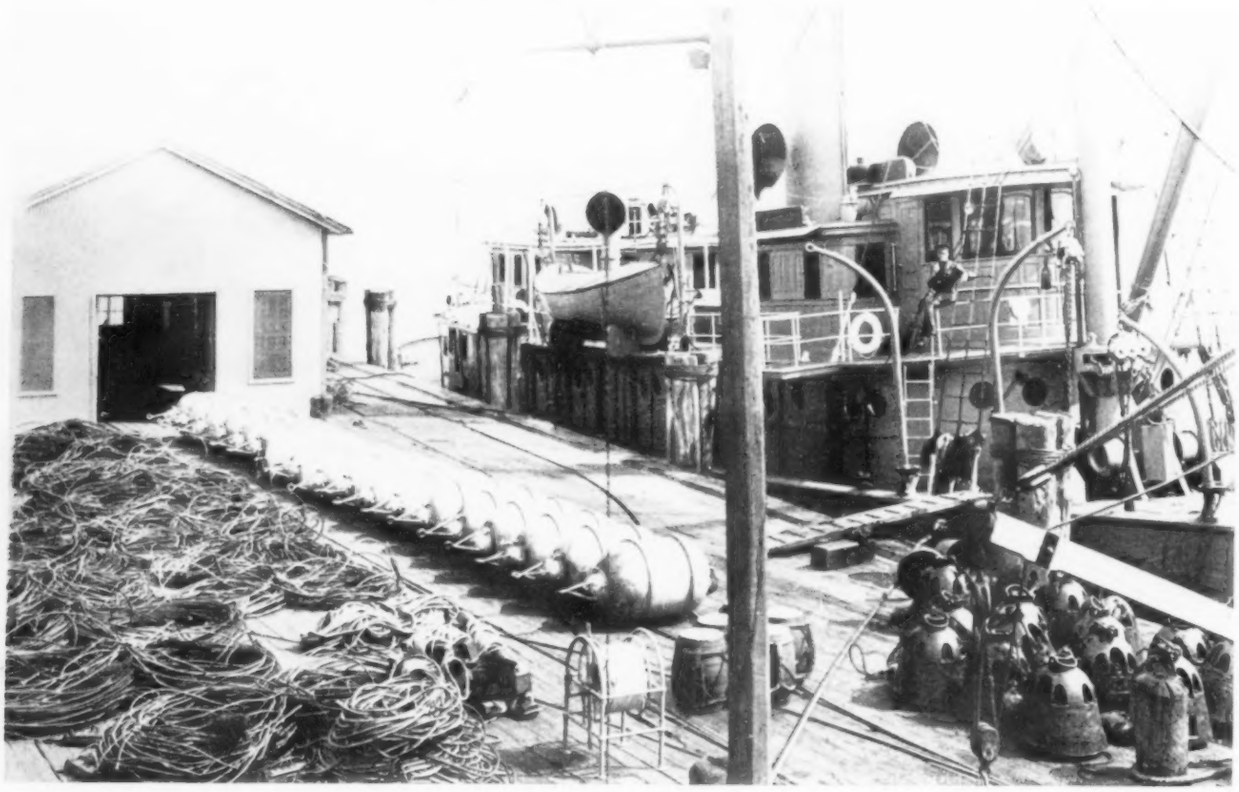
Mine Planter and Mines



The Army's new mine planter, the ELLERY W. NILES, *is shown above (Signal Corps photo). The diagram below shows one method of planting mines when the bottom is very uneven or soundings cannot be taken. The automatic anchor pays out the cable until the plummet strikes bottom. The mine is then carried down a distance equal to the plummet-line length.*


Mine Case
Surface of water
Mooring Cable - Pays out until plummet hits bottom.
Anchor
This equals amount of submergence desired.
Plummet
Surface of Bottom
Mine Case
Mooring Cable - Ceases to pay out when plummet hits bottom and mine case is pulled below surface of water.
Anchor
Plummet

Stowing the Mine Gear

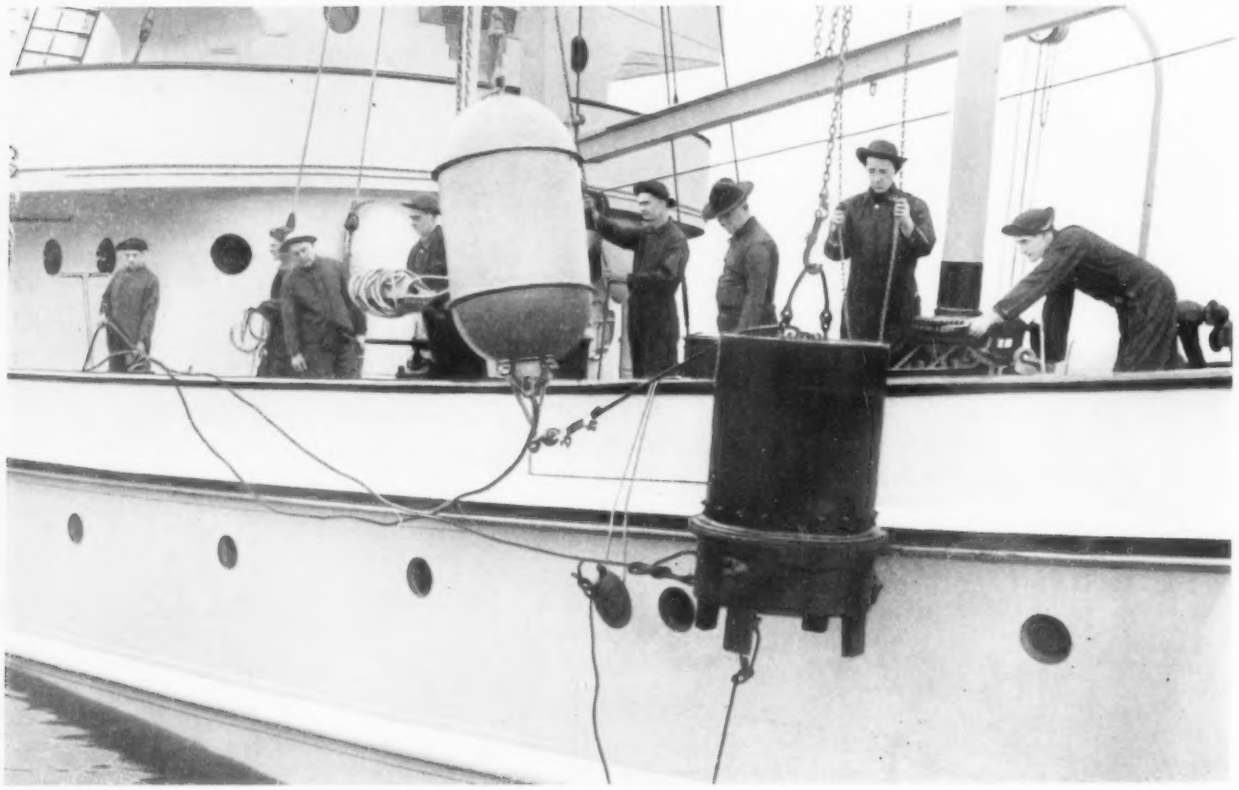


The loaded mine cases, anchors, and cables, shown above, are ready to be placed aboard a mine planter (Signal Corps photo). Below are shown the short lengths of electrical cable, used to connect the individual mines to the distribution box, being arranged in "figure eights" on the stern of the mine planter by men of the Coast Artillery Corps of the U. S. Army.

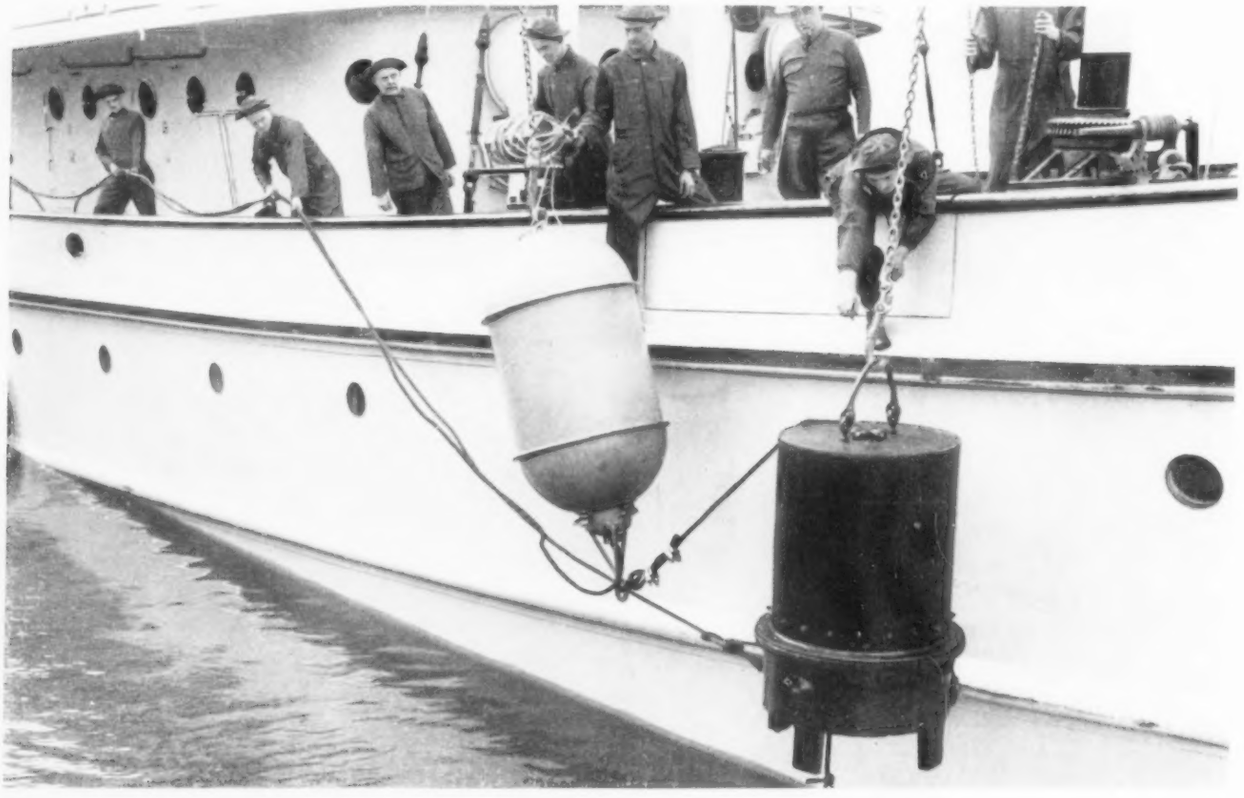
Preparing to Lay the Mine

Aboard the mine planter, a mine case (left, above) is about to be fastened to its anchor (right) by the mooring cable, preparatory to being planted. Before this, however, after each piece of equipment is stowed aboard in its proper position, water-tight joints are made, as shown below, connecting the firing device of each mine to the proper electrical cable.

Placing the Mine and Its Anchor



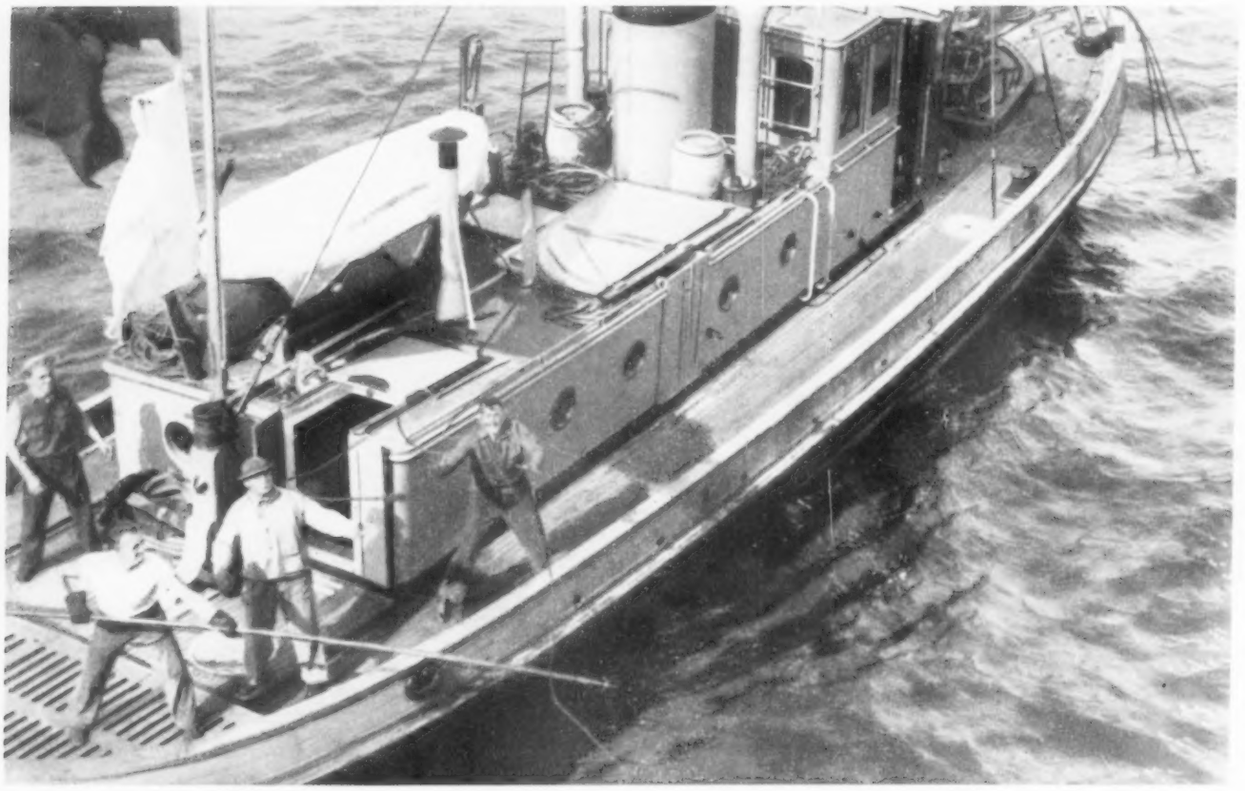
As the mine planter nears the spot where the mines are to be layed, a mine and its anchor, above, are swung over the side on davits. In the photo below, the mine and anchor are about to be released. Note the men ready to trip the catches on both mine and anchor, the plummet line, and the cable which will be connected to the distribution box (see frontispiece).



Gathering the Mine Cables

The crew of the mine planter, above, watch the mine and anchor plunge to the bottom. When a group of controlled mines has been planted in conformity with a predetermined plan for harbor defense, the cables from each are secured by men in small boats, as shown below. These cables are taken to another auxiliary vessel, known as the "distribution-box boat."

The Final Step—Connecting the Mine Cables



The free end of an electrical cable leading from a planted mine is thrown aboard the distribution-box boat, above. On this craft the necessary electrical connections are made between the cables leading to the individual mines and the cable leading to the control station on shore. Below can be seen a number of cables which are being connected to the distribution box.

War Contracts

The Six Types for Use in Buying Military Supplies

By Lieut. Col. John P. Dinsmore*

ON September 11, 1939, the Assistant Secretary of War approved six war contract forms for use in a national emergency. These forms are based on the accumulated experience and study of many years and represent a distinct forward step in their field. To evaluate them correctly and to understand their purpose and effect, some historical knowledge is necessary.

During the World War the several purchasing agencies of the War Department evolved and used some four hundred different contract forms. The current administration of a vast number of contracts containing so many diverse provisions presented grave difficulties, but the abrupt termination and subsequent settlement of many thousand such contracts involved still graver ones.

As a result of that lesson, it was concluded that Government contract procedure should be standardized. As a result, in 1921 a board was created in the Bureau of the Budget on which all interested agencies of the Government were represented. After extended study, during which the views of interested sections of commerce and industry were obtained and considered, that board prepared and the President approved a group of standard contract forms covering all types of Government procurement, the use of which in peace time by all Government procurement agencies is now compulsory. These forms have been in daily use for many years, have been extensively interpreted administratively, and to some extent judicially, and are generally understood by Government representatives and industry alike.

At about the same time the board referred to above (known as the Interdepartmental Board of Contracts and Adjustments) was created, the War Department organized a board to prepare standard contract forms for use in war time, on which the Assistant Secretary of War, the Judge Advocate General, and all the Army's supply arms and services were represented. That board, in conjunction with the Planning Branch of the Office of the Assistant Secretary of War, has continuously pursued its task by making very extensive studies of War Department procurement problems, during the course of which criticisms and suggestions from industry have been freely invited and considered, and advice from the Navy Department sought and obtained. As a result, tentative war contract forms have been drafted and from time to time revised and re-revised. The forms now approved represent the fruit of that labor as well as the special efforts of a group of experienced officers on duty in the Office of the Judge Advocate General.

These forms have been prepared upon the thoroughly sound theory that a national emergency will create new procurement problems but will not remove most of those present in peace time, and that provisions which, by actual use, have been found to preclude or to minimize controversies in peace-time contract procedure should be retained to the fullest extent practicable and supplemented only so far as may be necessary to meet war-time conditions.

THE primary purpose of emergency contract procedure is to obtain supplies or installations in the quantity, of the character and quality, and at the time and place needed. Speed is always essential. One commentator has described an ideal war contract as one which can be let quickly, administered economically, and terminated with little aftermath. But there are other considerations. For example, it is quite generally agreed that excessive profits must be eliminated and actual profits drastically limited—a result which may be accomplished fully only by taxation, and not by contract procedure alone.

Nor does it follow that the rights and interests of Government war contractors may be disregarded. On the contrary, fair dealing, common sense, good business, and the Government's own interest require that such rights be respected, because in a great many if not in all cases, the whole-hearted

A PRESSING problem of preparedness is the adequate safeguard to be applied to contractual procedure in time of war. Thousands of things in thousands of quantities must be bought. Purchases will range from chocolate bars and emergency kits to locomotives and seacoast guns. While the preservation of peace through victory is the one purpose of our armed forces, there are rights and duties arising from the relationship of buyer and seller on the part of the Government and the individual citizen. These duties must be fulfilled and these rights must be protected. Each must be approached in a sense of fairness to the other. Government can ill afford to step beyond the bounds of firm discipline; the individual dare not, in conscience, take undue advantage of emergency conditions.

In this spirit, there recently have been made public by the Army and Navy Munitions Board the results of years of study as to the best and most simplified types of contracts to be used for the purchase of military supplies in time of war. An analysis of the several proposed types is presented here by an officer who is especially qualified.

In the belief that this article will be of particular interest to American industry and the professions, it will be reprinted as a brochure and will be distributed without charge. Readers who wish copies may obtain them upon application to the Editorial Offices of ARMY ORDNANCE, *806 Mills Building, Washington, D. C.*

—EDITOR.

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coöperation of contractors is essential if results are to be satisfactory. Unless their interest in economy, promptness, and faithful execution can be enlisted, any program is very apt to falter and perhaps to fail. With this thought in mind, it has been said by one familiar with their terms that the purpose of the present war contract forms is to initiate early production, prevent undue profits, protect the contractor against undue hazards, and provide for prompt payment and early final settlement.

In the order in which they will be discussed, the war contract forms are the: (1) Requisition order, (2) Construction contract (fixed-price), (3) Contract for supplies (fixed-price), (4) Short-form contract for supplies, (5) Contract order A, (6) Contract order B.

Although it is not strictly applicable to the person to whom a requisition order is issued, for brevity and convenience the word "contractor" will be used in this article in describing all forms.

The most potent but, if World War experience is repeated, the least likely to be used of the new forms is the requisition order. As is well known, Section 120 of the National Defense Act, passed in 1916 (39 Stat. 213; 50 U. S. Code, 80) empowers the President, in time of war or when war is imminent, through the head of any department of the Government, to place orders with any individual, firm, association, company, corporation, or organized manufacturing industry for any required product or material of the nature and kind usually produced or capable of being produced by any such individual, concern, or industry. It further provides that compliance with all such orders shall be obligatory and shall take precedence over all other orders and contracts theretofore placed with such individual, concern or industry. The statute provides that the compensation for any such product or material shall be fair and just.

The approved form has been prepared for use in those cases in which the President may find it necessary to exercise, through the Secretary of War, the authority conferred on him by this statute. It is a mandatory order, compliance with which is compulsory, but it contains provisions which are designed to encourage willing compliance with its terms. These include a provisional price which will enable the manufacturer to receive payment for units delivered without awaiting a final price determination and definite statements concerning matters which are frequently the subject of dispute, such as customs duties, taxes, changes, inspection, payments, and delays.

IF it is possible at the time the order is issued for the War Department to fix a unit price which it considers fair and just, the price so determined will be named in the order, and the person to whom the order is issued, provided he is willing to do so, may formally indicate his acceptance of it and settlement will be made accordingly. If the price named is not satisfactory to the manufacturer or supplier, he may so indicate, in which event the form provides for the payment to him of a percentage only of the amount designated and expressly recognizes his constitutional right to institute suit against the United States for such additional amount as he may believe he is entitled to receive as the remaining portion of fair and just compensation.

If for any reason it is impracticable to determine in advance what compensation will be fair and just for the material or products called for by the order, the form provides for the fixing of a provisional unit price. This will be used for settlement purposes pending later determination by the Secretary of War of the actual price to be paid, at which time the account will be adjusted by application of the final price so determined to all articles covered by the order. The manufacturer may agree to accept this final price, or he may refuse to do so and elect to receive a sum less than the full compensation so fixed, leaving the sum finally to be paid to judicial determination. Except for the compensation provided, the order must be accepted and fulfilled without reservation.

The construction contract (fixed-price) and contract for supplies (fixed-price) follow quite closely the corresponding peace-time standard forms with only such modifications as have been considered necessary to meet emergency conditions. In order to avoid repetition, a fuller description of these forms will be made in due course hereafter.

The short-form contract for supplies is, as its name implies, a relatively simple form designed for us in those cases in which well-known articles of standard type are desired for early delivery, no particular difficulties are anticipated, and the more elaborate provisions of the regular supply contract are deemed unnecessary. However, some of the provisions of the standard peace-time form are printed on the back of this short form and incorporated by reference, while other peace-time conditions designated as optional also are provided for use if desired.

Contract order A is a combination of a mandatory order issued under authority of Section 120 of the National Defense Act and a fixed-price contract for supplies. It is designed for use in those cases in which a manufacturer or supplier is able and willing to give preference to the production or delivery of supplies or materials required by the Government provided he can be relieved of responsibility for failure to comply with his outstanding commercial commitments. This result is accomplished by the mandatory order. In all other respects the form constitutes a fixed-price contract for supplies, and when the contractor signifies his willingness to comply with its terms, it becomes such a contract. Although this form does not follow strictly the wording of the contract for supplies, it embraces many of the provisions contained in that contract.

ALL the forms so far discussed call for fixed prices, which fact indicates the War Department's purpose to use that form of contract to the fullest possible extent, even during an emergency. This is a sound policy. Fixed-price transactions are customary throughout the entire business world, and adherence to this practice will avoid many problems. Other methods may seem alluring, but experience demonstrates that they invite difficulties, both known and unanticipated.

At the same time, the fact must be faced that under emergency conditions the novelty of certain equipment required by the Government, lack of experience on the part of the prospective contractor—either with the product itself or with the process of its manufacture—necessary employment of new and difficult or complicated manufacturing procedure, or required expansion of plants or production facilities, may render it impossible for either the Government or the prospective contractor to arrive at a reliable cost estimate at the time the contract is executed. Under such circumstances, if the Government elects to insist on a fixed price, sound business and elementary principles of self-preservation require the contractor to name one sufficiently high to protect himself against all contingencies. The considered opinion of those who have

studied this problem most thoroughly is that its best solution is one under which the contractor may be insured against loss and the Government protected against undue profits and waste.

Much has been said and written about the iniquity of so-called cost-plus contracts and there can be no doubt that such contracts lend themselves readily to abuse. This was abundantly demonstrated during the World War when many contracts were so drawn as to give the contractor every incentive for extravagance and none whatever for economy of operation. But the fact seems to have been generally overlooked that the evil lies in the manner in which the cost-plus principle is applied rather than in the principle itself. Theoretically there is no reason why one type of contract should be more unfair to either party than another type. The fixed-price contract also may be abused. No form is foolproof.

In an effort to meet the situation last described with fairness to all parties concerned, in the light of World War experience the War Contract Board at one time prepared a form for the procurement of supplies known as the adjusted-compensation contract. This form was designed to supplant the straight cost-plus-a-stipulated-percentage-of-cost contract used during the World War. It provided for a maximum and a minimum cost percentage with a provision authorizing the chief of branch to fix the contractor's fee within those limits upon the basis of an evaluation of the efficiency of the contractor's performance.

This form had many advantages, including the very great merit of providing a simple and easily applied method of determining the amount due the contractor. Excessive profits were excluded. But the form was criticized severely because its application would require a number of involved and difficult determinations. Based on preliminary data prepared by the contractor, it would have been necessary, before the contract was executed, for the parties to agree upon eight different subjects; namely, the value of facilities owned by the contractor and to be used in the performance of the contract, the proper allowance for depreciation, the cost of rehabilitation, the cost of new construction, if any, the time of performance, the cost of material, the cost of labor, and the cost of overhead properly chargeable to the contract.

The fundamental difficulty of arriving at any reliable cost estimates with little or no cost information available is apparent. The critics of this form also pointed out that necessary negotiations might well consume considerable time under circumstances when time would be very precious, that the Government necessarily would be at a disadvantage in such negotiations, and that the whole plan would tend to encourage the contractor to attempt to obtain agreement to as high an estimate as possible. Subsequent evaluation of the efficiency of the contractor's performance by the chief of branch concerned would likewise require somewhat involved determinations and present other difficulties.

CONTRACT order B was prepared in order to provide a form applicable to those situations in which cost, and therefore reasonable price, cannot be determined in advance but one free to the fullest possible extent from objectionable features. Like contract order A, this form combines a mandatory order issued under authority of Section 120 of the National Defense Act with the provisions of a contract for supplies. The effect of such an order on commercial commitments already has been pointed out. The unique feature of this form is that it really creates two contracts, or to be more accurate, a preliminary undetermined-price contract which becomes transformed into one at a fixed price. During its first phase, such a contract will provide actual experience and therefore a sound basis on which to determine a reasonable fixed price for the entire contract. For example, if ten thousand units of a given product are required, the first thousand could be manufactured under preliminary-price provisions after which a definite price for all the units covered by the contract might be fixed and applied.

Because this form is in a class of its own and because of widespread interest in the particular type of contract which it is designed to effectuate, a full description of its price provisions is deemed appropriate. The form recites that it is "now impracticable" to determine fair and just compensation for the material or products specified, for which reason the fixing of the price will be subject to later determination by the Secretary of War. Pending that determination, the form names a provisional unit price which may be varied by agreement as circumstances warrant, with the understanding that such provisional price will not be considered as having any bearing upon the price to be subsequently fixed.

Acceptance of the price subsequently fixed will be considered as constituting a release of all claims arising under the contract order, except as otherwise provided therein. In the event the price subsequently fixed is not acceptable to the person to whom the order is issued, the form specifies that his account will be adjusted to provide payment of a stipulated percentage of the designated amount. It expressly recites that a suit may be instituted against the United States for such additional amount as the person to whom the order is issued believes he is entitled to receive as the remaining portion of a fair and just compensation.

AS an alternative provision, after reciting that it is "now impracticable" to determine fair and just compensation by unit price, the form provides that payment for a stipulated number of units and services required under the terms of the contract order (or such number as the person to whom the order is issued and the Government representative executing the order may "hereafter agree" to be necessary for the purpose of determining a just compensation by a unit price) shall be the actual cost of production and a stipulated unit fee—or a fee consisting of a stipulated cost percentage.

The form sets forth the actual cost of production to be paid by the Government and the cost upon which the fee is to be computed when on a cost-percentage basis as follows:

"*a.* Cost of all direct labor and all direct and indirect materials definitely ascertainable as necessary for and devoted exclusively to the items required by this contract order. The Government shall have the option of furnishing any or all of the materials aforesaid and when this option is exercised, the cost of such materials will be included as part of the cost for the purpose of computing the fee. The cost of materials shall be the net cost for the purpose of computing the fee. The cost of materials shall be the net cost to the manufacturer; *i. e.*, invoice cost less cash, trade and quantity discounts, plus duty, import expense, freight and drayage paid by the manufacturer. Scrap resulting from this order shall belong to the Government, or by agreement a proper amount representing the value thereof shall be credited to the costs chargeable to the Government under this contract order as may be provided by law.

"*b.* A proper proportion of overhead expenses. By the term 'overhead expenses' is meant the indirect labor and other expenses incidental to manufacture and the general and administrative expense pertaining thereto, including the moving and rearrangement of existing equipment and the installation of new equipment and appliances purchased by the Government or acquired by the manufacturer under the provisions of this contract order. Premiums on such bonds, including performance and payment bonds and such insurance policies as may be required for the protection of the Government or required by statute, and premiums on such public liability, employer's liability, workmen's compensation, fidelity, fire, theft, burglary, and other insurance as may be reasonably necessary for the protection of the manufacturer will be included in overhead if approved in advance.

"The following items may be included in overhead but shall not be included in the cost for the purpose of computing the fee: payments under the Social Security Act; federal, state and local taxes or charges applicable directly to the items ordered; depreciation at fair rates on such property and equipment as is owned by the manufacturer and is being used in the performance of this contract order; and, if approved in advance, royalties on patents used including those owned by the manufacturer, and rental charges paid by the manufacturer for productive utilities used in connection with this order. Overhead shall not include contributions to charity and other gratuities; bonus payments based on profits earned by the manufacturer; inapplicable research; appropriations to reserves for bad debts; excessive salaries; extraordinary repairs to buildings or other items properly chargeable to capital accounts; credit losses not satisfactorily accounted for; expenses incurred in connection with issue of new stocks or bonds; and income and profit taxes.

"*c.* The foregoing allowances shall apply to all labor, direct or indirect, and to all materials involved in the manufacture and services agreed to in this contract order whether items produced be accepted or rejected by the Government, or subsequently reworked after rejection, if so ordered, provided that in the judgment of the approving officer, the manufacturer, his employees and subcontractors and their employees have taken due precaution to prevent and have not been guilty of carelessness, inferior workmanship, or unnecessary damage to material. Cost of reworking items rejected through failure of the manufacturer, his employees or subcontractors or their employees, to exercise due precautions shall be subject to special adjudication between the Government and the manufacturer. On such manufacturing work as the manufacturer may by specific authority procure by subcontracts, the fee allowed will be one-half of the stated fee if based on a per cent of cost; if based on a unit fee, the fee allowed will be reduced by an amount equal to —— per cent of the invoice cost of such subcontract work.

"*d.* If payment therefor is approved in advance, the Government will pay the cost of necessary machinery, equipment and appliances, and temporary structures required in the performance of this order, but such costs shall not be included in the cost for the purpose of computing the fee. Title to all such property shall vest in the Government.

"*e.* Higher rates of pay for labor than those usually and currently paid for similar work in the same locality shall not be allowed under this order. Materials, machinery, equipment, and appliances, paid for by the Government, shall be purchased at the lowest possible prices and subject to inspection and acceptance by the Government. Payments shall be made on a basis of actual expenditures after submittal of bills, payrolls, or statements of expenses involved, certified and submitted in such form as shall be directed by the chief of branch concerned. Fees and depreciation shall be paid monthly as they accrue, provided however that, pending the final determination as to the depreciation to be allowed, provisional monthly payments may be made. Accounts and records of the dealer and manufacturer shall be open at all times to inspection by the Government, and no change shall be required in the present methods and principles of keeping costs provided they are found adequate for the convenient and accurate determination of proper charges against the Government."

The form provides that the cost shall be subject to Government approval prior to payment thereof, and also provides that after production of the required number of units on a cost basis, a fair and just unit price based upon this production cost shall be determined by the Secretary of War for the remaining production and services required under the order. This price may be accepted by the person to whom the order is issued or rejected subject to payment of a percentage only of the designated amount due and the assertion through appropriate litigation of any further rights which the person to whom the order is issued considers himself entitled.

UPON the assumption that the reader is conversant with the provisions of the Government standard forms used in peace time, extended descriptions of those forms and of all the provisions common to them and to the war forms is omitted. It may be stated, however, that all the war forms that have been described follow the standard peace-time forms by providing for changes in drawings, specifications, crating and packing instructions, and points and dates of delivery, with the proviso that an equitable adjustment of the amount due will be made if any such change increases or decreases that amount, and by relieving the contractor from liability for delays or defaults in performance due to unforeseeable causes beyond his control and without his fault or negligence, provided the Government is notified of the cause of such delay within ten days from its beginning. All forms, except the short-form contract for supplies, likewise contain the usual standard peace-time provision with reference to partial payments.

Specific reference to particular statutes, such as the 8-hour law, have been omitted because it is impossible to foresee exact legal requirements in an emergency, but all forms, except the requisition order, are accompanied by instructions which require that any provisions respecting labor or materials required by law to be included in the contract shall be duly inserted.

In war time, a large measure of decentralization of administrative authority is essential; otherwise serious, costly, and perhaps fatal delays will result. For this reason the war forms confer upon the chief of branch concerned a large measure of the discretionary authority normally exercised in peace time by the Secretary of War. For example, all the forms except the requisition order authorize the chief of branch to approve changes involving not more than $25,000, and all forms except the requisition order and the short-form contract for supplies provide that any decision of the chief of branch concerning a question of fact shall be conclusive when the amount involved is $15,000 or less. Both the contract for

supplies and the construction contract empower the chief of branch to authorize the adjustment of claims not filed within the time prescribed by the contract but filed during its life.

All the war forms provide for adjustment of the contract price if the cost of labor or material used in its performance is changed by order or with the approval of a duly authorized federal or state agency. This provision does not appear in peace-time forms. All the war forms also provide that if any sales tax, processing tax, adjustment charge, or other taxes or charges (not including any income or excess-profits taxes) are imposed or changed by federal, state, or local authorities and made applicable directly upon the production, manufacture, or sale of the supplies covered by the contract, or, in the case of construction, properly chargeable to the contract, and are paid by the contractor, the amount due under the contract shall be increased or decreased accordingly. It is well known that uncertainties which must be faced by the contractor and hazards which he must assume always increase the Government's costs. If the contractor can be given reasonable assurance against loss, the principal obstacle to fixed-price contracts will be removed. It was with this object in view that the provisions just described were prepared.

A provision not used in peace but plainly desirable during war appears in all war forms, except that for construction, to the effect that articles which do not conform to contract specifications may nevertheless be accepted at a proper reduction in price.

ANOTHER contract provision plainly necessary in war time is a clause giving the Government the right to terminate the contract at any time. Such a clause has been incorporated in all the war forms, accompanied in every instance by provision for a fair and just settlement. The exact form of this provision varies from a brief statement in the requisition order, short-form contract for supplies, and contract order B, respectively, that a fair and just settlement will be made, to rather elaborate provisions in the contract for supplies, provisions somewhat less elaborate in contract order A, and a provision in the construction contract.

These provisions stipulate that if the contract is terminated, except for the contractor's default, an audit will be conducted by the contracting officer based on which the Government will pay to the contractor (1) all costs incurred by him, including plant rental, less amounts already paid, (2) an agreed percentage of the total cost, and (3) costs actually caused the contractor by the termination of the contract. The contract for supplies provides that if the contract is terminated, other than for the default of the contractor, the Government shall pay to the contractor (1) the contract price not previously paid for articles completely manufactured or work and services completely performed, and (2) for the uncompleted portion of the contract an amount to be computed as follows:

(a) There shall be determined by an audit conducted by or for the contracting officer the total net amount of all expenditures and obligations made or incurred by the contractor under the contract with reference to the uncompleted portion thereof. (b) The contractor and the contracting officer shall agree upon an estimate, based on the foregoing audit and any other pertinent data, of the net cost to the contractor of fully completing the contract had it not been terminated, including in such estimate all costs previously incurred under the contract as to its uncompleted portion as well as those costs which would be required in the future for its entire completion. If the contractor and the contracting officer fail to arrive promptly at such an agreement, the estimate will be determined in the same manner as any other dispute. (c) The percentage which the foregoing item (a) is of item (b) shall then be determined and a sum of money equal to that same percentage of the total contract price of the uncompleted portion thereof shall then be computed. (d) The total of all payments, if any, previously made to the contractor on account of the uncompleted portion of the contract shall be ascertained. (e) The contractor shall then be paid the sum computed in accordance with (c) above, less the total of item (d). If it is determined that the sum total of the payments so provided is not adequate to cover the costs to which the contractor has been subjected by reason of the termination of the contract, the Secretary of War may add thereto a sum sufficient to cover such costs and his action shall be final and conclusive.

With variations conferring authority upon the chief of branch, all the war forms, except the requisition order and the short-form contract for supplies, make use of the standard peace-time dispute clause, but a novel feature in federal contract procedure is introduced by the insertion in contract order A and contract order B of an arbitration clause under which the Secretary of War may refer any appealed case to a board of three arbitrators, one of whom shall be selected and paid by the chief of branch concerned, one selected and paid by the contractor, and the third selected by the other two and paid, together with the expenses of the arbitration, by the parties jointly.

The form provides that the decision of this board shall not be binding on the Secretary of War, but that its findings and conclusions shall be given due consideration before his decision is rendered. The form makes it clear that the use of this clause must depend on future statutory authority. Although this clause does not deprive the Secretary of War of authority to make final determination of all questions of fact, those responsible for its preparation believe that its use will tend to remove any fear or arbitrary or unwarranted action in any such case.

The authors of these forms would be the last to assert that they are perfect. All human endeavor is progressive. But those who would improve them must remember that they represent the composite thought of a very large group admirably fitted both by training and experience for such an undertaking, and must admit that they evidence a high degree of War Department forethought and that there can be little if any doubt that they will accomplish the purpose for which they have been designed.

EDITOR'S NOTE.—Particular attention is directed to the degree in which the forms described above meet the general requirements of war contracts. These requirements as enumerated in the Industrial Mobilization Plan, Revised 1936, are to (1) initiate early production; (2) prevent unreasonable profit; (3) protect the contractor from hazards of war-time production while permitting a reasonable profit; (4) provide for prompt payment and early final settlement, and (5) provide for fair and prompt settlement in the event of cancellation or termination by the Government before completion. In addition, this contract procedure in time of war must strive to provide an effective stimulus for production and to protect the interests of the Government. The forms here described aim to accomplish these ends.

ARMY ORDNANCE

Published Bimonthly by
THE ARMY ORDNANCE ASSOCIATION
WASHINGTON, D. C.

MARCH-APRIL, 1940

Month by Month

IN THE WELTER OF ANNUAL REPORTS MADE public by the constantly expanding agencies of the Federal Government—many of which are palpably of doubtful value, those publicized by the War Department in recent weeks are worth while. They bring an assuring message on the status of the Army from the standpoint of recruitment, training and armament. In particular, the report of the Assistant Secretary of War, Louis Johnson, produces facts and figures which indicate the rapidity and facility with which the present tremendous rearmament is being handled. Aircraft and ordnance programs lead the procession and, be it said for the consolation of those officials in the military service and in industry who are guiding them, that the ease of operation of both is somewhat startling.

The Army Air Corps and the aircraft industry have their largest assignment at the present moment. The Ordnance Department, the arsenals, and collaborating private industrial plants, also are engaged on a schedule of production, the like of which has not been seen in a generation. That these and other important phases of the current program are progressing with a maximum of good results and a minimum of delays and conflicts is an assuring sign in this important particular: it indicates that preparedness philosophy of the past twenty years has not been amiss. The ease with which a great peace-time armament enterprise can be undertaken and successfully met is justification for all the planning of previous years.

Mr. Johnson includes some of the salient figures for the fiscal year 1939 in his report. The total money values of aircraft orders placed during that year include: airplanes and spares, $47,539,919; engines and spares, $32,908,849, and other Government-furnished equipment, $11,783,463—a total of $92,232,231. "While Air Corps requirements have dominated the War Department procurement field," writes the Assistant Secretary, "extensive purchases also have been made to meet the needs of other arms and services. Production orders have been placed for a 400 per cent increase in the number of sound locators for antiaircraft fire control, a 210 per cent increase in 3-inch antiaircraft guns and carriages, a 140 per cent increase in antiaircraft machine guns, a 153 per cent increase in semiautomatic rifles, a 130 per cent increase in directors for antiaircraft fire control, and a 15 per cent increase in trench mortars and scout cars. Contracts have been placed for the first time for quantity purchases of antitank guns and 37-mm. antiaircraft mounts. Orders have been placed with industry for assorted types of ammunition aggregating approximately $12,000,000. More than $4,000,000 were used to buy war-reserve machinery. Springfield Armory was tooled up, at a cost of $1,800,000, for increased production."

REFERENCE TO THE NEW SEMIAUTOMATIC shoulder rifle M1, now being manufactured and distributed to the Regular Army and the National Guard, recalls a statement issued by the Ordnance Department on December 14, 1939, that the rate of manufacture is comparable to or even more rapid than that of the average new weapon. It is now known that daily production of the M1 at Springfield Armory is over 100 rifles per 8-hour day and that within a few months this number will be doubled. A contract for the manufacture of 65,000 of these rifles has been awarded to the Winchester Repeating Arms Company, supplementing the quantities now being produced and to be produced at Springfield. All Infantry troops now in training in the South will have the new semiautomatic rifles by spring. In addition, thirteen National Guard Infantry regiments are also receiving the rifle at present.

Reviewing the chronology of design and development of the Army's new semiautomatic shoulder arm, the Ordnance Department's statement reads: "The construction of a pilot model was authorized on November 7, 1929, and the order was placed with Springfield Armory on November 14, 1929. The pilot model was completed in October 1931, tested at Aberdeen Proving Ground October 9 and 10, 1931, and returned to Springfield Armory for correction of defects which developed in the test. The second test was made February 18, 23, and 24, 1932, and the rifle returned for further correction of difficulties encountered. The third test was conducted March 21 and 22, 1932. Upon completion of this last test, instructions were given for the manufacture of eighty models for extended-service test. This order was placed with Springfield Armory in March 1932. The eighty rifles were completed and delivered in May 1934—fifty to the Infantry Board at Fort Benning and twenty-five to the Cavalry Board at Fort Riley.

"These eighty rifles were manufactured on a semiproduction basis; that is, tools, jigs, and fixtures were designed, manufactured and used in their construction in order to maintain interchangeability of parts. These manufacturing aids were not, however, of a type suitable for large-scale mass production.

"The service tests of these rifles were suspended in August 1934 due to failures of certain major components. The rifles were returned to Springfield Armory for redesign and replacement of these components. This work was completed and the redesigned rifles again submitted to the using services in May 1935. The service tests were completed in December 1935 and the rifle was officially standardized in January 1936.

"It is desired to point out that the development of the caliber .30 rifle was carried on concurrently with the development of the caliber .276 semiautomatic rifle until February 1932, at which time further development of the caliber .276 was discontinued."

Speaking at the annual meeting of the National Rifle Association in Washington on February 2, 1940, Maj. Gen. C. M. Wesson, Chief of Ordnance of the Army, announced that the semiautomatic rifle M1 is now being produced at the rate of 4,000 a month at the Springfield Armory and that deliveries under the Winchester order are expected to begin in November at the rate of approximately 3,000 a month and at an increasing rate thereafter. "It is expected," General Wesson said, "that the entire Regular Army and the National Guard will be equipped with it within the next two years."

Noteworthy in General Wesson's analysis of rifle marksmanship was his insistence upon battle efficiency of rifle and ammunition. He thus emphasized the 150-grain bullet (M2) as meeting all combat requirements equally as well as the 172-grain (M1) bullet which adds nearly a pound to the soldier's load.

THE FORMATION OF AN AIR-DEFENSE COMmand to assure the coördinated control of antiaircraft units, squadrons of pursuit ships, and aircraft warning services for the protection of an area against hostile air attack is an important milestone in our defense program. Such a unit has recently been established in the northeastern part of the United States, utilizing existing Army posts and air fields to maximum capacity. Brig. Gen. James E. Chaney, Air Corps, has been selected for this important duty.

At the present time, all mobile combat units of the Air Corps are concentrated in the GHQ Air Force. This command is divided into three wings, located respectively on the West Coast, the East Coast, and the Gulf Coast. It includes offensive and defensive types of aircraft: bombers, attack and pursuit airplanes, and reconnaissance squadrons. Our current antiaircraft defense consists of some fixed antiaircraft artillery in strategic localities but principally of mobile antiaircraft artillery regiments now scattered throughout the United States at Army posts. Creation of the new air-defense command will provide experience in the integration and coördination of these several elements and will be the basis for future developments in the control of air and antiaircraft units, interceptor-pursuit groups, antiaircraft regiments, and Signal Corps units.

Stimulating reports in the field of aviation ordnance also come from the new officer's aviation ordnance course at the Ordnance School, Aberdeen Proving Ground, Maryland. Eleven recent graduates now are engaged on a 3-month course of instruction in field service aviation ordnance at Langley Field, Virginia.

The course covers all phases of ordnance service required at an air base and includes four weeks of assignment to duty in GHQ Air Force and Second Wing ordnance offices. Two additional weeks then will be spent by each officer in training a bombardment platoon of the Tenth Ordnance Service Company. The last week of the course will be a field problem for illustration purposes in ordnance field service.

In a welcoming address at the first meeting of the school, Col. C. W. Russell, chief of staff of the GHQ Air Force, stated: "Ordnance relations with the Army Air Corps are still in a formative stage, and close coöperation between all component parts is essential for solutions of the many problems incident to the continual change of equipment and organization that has long been found necessary. The GHQ Air Force is a highly mobile unit dependent upon the supply branches for service and supply to increase the tactical efficiency of the organization. Ordnance faces a new and ever-increasing field of work in development and maintenance of bombs and other armament."

IN THE FIELD OF STRATEGIC MATERIALS, appeals have been made recently by responsible officials of the Army and Navy beseeching dealers and manufacturers in the United States to discontinue export activities which are detrimental both to the industrial economy of the nation and especially to the national defense. A statement on this subject from the Army and Navy Munitions Board, dated January 19, 1940, follows:

"On October 11, 1939, the Army and Navy Munitions Board in an official release called attention to the possibility that abnormal exports of certain materials classified as strategic might weaken the national-defense position of the United States with respect to such materials in spite of the best efforts of the Government to assure an adequate supply of these commodities.

"While there has been a cessation of abnormal exports of some deficiency materials since that statement, the situation in regard to others has become more difficult. In the case of crude rubber, for example, there is evidence of a strong demand for unusual exports, especially to European nations. Furthermore the greatly increased reëxport of pig tin from the United States to European nations has, in the past few weeks, become a matter of much concern.

"While the more patriotic and responsible dealers and manufacturers in the United States are coöperating with the Army and Navy Munitions Board in its effort to maintain an adequate supply of these materials in the United States, others, apparently through a lack of appreciation of the situation, or for other reasons, are continuing to engage in export activities detrimental both to the industrial economy of the nation and to the national defense.

"The War and Navy Departments believe that unless the method of voluntary coöperation can be counted upon to operate with complete effectiveness it will become necessary to use other means to deal with the situation which has developed with respect to the export of crude rubber and tin."

It should not be necessary to stress the vital importance of complete coöperation in these matters. As the statement indicates, patriotic and responsible dealers and manufacturers are coöperating to maintain an adequate supply of strategic materials in the United States. Unfortunately, there seems to be present in the country always a small fringe of traders whose selfishness verges upon disloyalty. If these do not see fit to coöperate, legal steps should be taken to compel them to do so.

But we hope that thing called "moral embargo" will not be used in this connection. Embargo of any kind is treacherous; when it is cloaked with morality it is doubly dangerous. If the national policy of the United States is to apply embargoes of certain things against certain nations, this obviously must be a matter of law to apply equally to all.

New Horizons

An Editorial

THE war in Europe is slowly but rigidly defining new horizons of military and naval responsibility. For one thing, this conflict, with its forebodings of greater strife to come, has brought to the people of the United States—far removed though they now be from the privations and losses of battle—a sense of realism which extends through all shades of opinion. The most crack-brained of our pacifists were the first to take cover. Next the Reds, shamelessly exposed by their own leaders, sailed for any port in the storm. Next, the "Union Now" lads, having quit their babbling, took their tongues from their cheeks and returned to reason. In fine, the first effects of the new outlook on this side of the Atlantic are all to the good: the crackpots who have been trying for years to scuttle our national defense have not a leg to stand on!

But greater results than these already are obvious. The present European war—if we are fearless enough to look other facts squarely in the face—makes our own national defense, its content and composition, stand out in bold relief. For above all, the war in Europe forecasts struggles and challenges which will not be solved in a day or a decade. They will be struggles and challenges of world-wide depth and breadth. Hence it behooves all sensible Americans, regardless of former foibles, to keep a stern eye on their own defense. In no other way will tomorrow's peace be kept.

Europe is now in the twenty-sixth year of what bids fair to be another Hundred Year's War. What has passed since 1914 is but prologue. In such an atmosphere there is but one course for us; namely, unanimity of outlook regarding our own posture of defense for any eventuality. General Washington himself has vouched for the truth that in this posture rests our sure peace. It must be a continuing posture, not subject to the whims and fancies of pressure groups, not assumed one day and discarded the next on the ground of expense; not renounced because it conflicts with some highfaluting theory that wars can be outlawed by talk. This posture must be held over a period of years if the old inefficiencies arising from the very lack of such a continuing program are not to be repeated. What, briefly, are the major points in a sane posture of defense appearing on the horizon as one surveys our military responsibilities when great world powers are at war?

THE answer to this pressing question is basic and brief. The continuing and all-important attitude of the people of the United States toward their military armament should be this: To make available by every means at their command the equipment and facilities needed for our Army in being. The size of this Army—Regular, Militia, and Reserve—is to be determined by national objectives. Size having been determined, the Army must be guaranteed fighting equipment equal in quality to that of any other army in the world and in quantity sufficient for the prompt and effective fulfillment of any task which may be placed upon it in conformity with declared national policy.

Specifically, this national duty has several definite connotations. Among these are the following: Plans for the mobilization of man power must go hand in hand with plans for the mobilization of industry to meet war-time obligations for munitions of all classes. The military mind, if such there be, which disregards the industrial phase of modern war, is not worthy to command a triangular squad much less a triangular division! The civilian mind, if such there be, which disregards the obligation to meet military requirements promptly and effectively in time of war, is not worthy to enjoy the blessings of continuing peace. The composite mind, if such there be, which disregards the time factor required to prepare an industrial nation for effective defense, which preaches that the transition from peace to war is a matter of a fortnight—such mentality is not worthy of the blessings of citizenship. The potentiality of the United States for quick mobilization of industry to meet war-time requirements is an essential part of the dual peace-time task—the preparedness of men and munitions.

Obviously there are collateral responsibilities which are clear on the new horizons of military and naval responsibility. The equipment for our Army must be up to date and complete. No one in his senses can deny this obligation in the face of the experiences in China, Spain, Poland, and Finland. Then there must be ample war-reserve stocks of equipment to meet the needs of our armed forces between mobilization and the time when sufficient industrial production is developed. Mathematically translated, this means simply a restatement of the Burns theorem of military supply preparedness: stocks plus production must equal requirements.

What we have chosen to call the Burns theorem is a long established postulate of industrial preparedness which has been succinctly and forcibly stated by Col. James H. Burns, Ord. Dept., U. S. Army. Last year, in the pages of this journal he wrote: "I want to emphasize that a fundamental rule of supply preparedness is that stocks plus production must equal requirements. The more we can rely upon production, the less the Government has to spend for stocks. In turn, production depends upon the output of the many individual plants making up American industry. The individual plant is eventually the very foundation of preparedness."

Beyond these considerations the military problems of our defense do not go. Diplomacy, international law, and statesmanship must set the confines of our sphere of influence; certainly it is not the peace-time function of the soldier to do so—but it is decidedly the function and the obligation of the citizen. If the mandate of Hemisphere Defense is definite, then must the United States give every possible assistance to the nations of the Western Hemisphere in the training and munitionment of their forces. Here to the north and south of us are friendly peoples whose interests and aspirations as well as whose geographical propinquity tend to unify the defense obligation of each for the common benefit of all. As this sound condition comes about, the rôle of American industry will grow apace. It will be desirable and essential for private industry, whose coöperation has enabled the military power of the United States to reach such potential proportions, similarly to strengthen the weaknesses of Hemisphere Defense. In this way may we hope for a sharing of the common obligation and thus a lessening of it for all concerned. On such terms for all our friends, neutral and belligerent, will our best service be rendered for peace. For when peace comes again to Europe it will be based on reality. So must the continued peace of the Western Hemisphere be founded if it is to shorten the shadows on the new horizons. L. A. C.

Association Affairs

NEW DIRECTORS OF THE ASSOCIATION

WILLIAM C. DICKERMAN of New York, Herbert A. Gidney of Pittsburgh, Earl B. Gilmore of Los Angeles, and L. W. Scott Alter of Cincinnati, recently have become members of the board of directors of the Army Ordnance Association. Each of these gentlemen has been chosen as a director to represent the local chapter with which he is identified. The constitution of the national Association provides (Article IV, Section 3) that "the board of directors shall consist of the president, who shall be *ex officio* chairman, the vice-presidents, one member elected by each duly authorized Post of the Association, and six members elected by general ballot of the members of the Association . . ."

These new additions to the directorate are members whose long record of interest and coöperation in Ordnance affairs is well known. Mr. Dickerman, chairman of the American Locomotive Company, has long been identified with the civic and industrial leadership of our country. Mr. Gidney, comptroller of the Gulf Oil Corporation, served in the Ordnance Department with distinction during the World War. He was one of the organizers of the Pittsburgh Post and for the past few years has served as president of that chapter. Mr. Gilmore has been president of the Los Angeles Post since its organization, May 27, 1936. He is president of the Gilmore Oil Corporation of Los Angeles and has taken a leading part in the stimulation of interest in ordnance in Southern California.

Mr. Alter, president of the American Tool Works, is well known among the machine-tool fraternity of the country and until the present year served as president of the Cincinnati Post of the Association. All members of the Association throughout the country will join in welcoming these gentlemen to the governing board—a group already known for its ability and service to the national defense.

NEW YORK POST MEETING

THE largest dinner-meeting of any local chapter of the Army Ordnance Association was held by the New York Post on December 12, 1939, when a testimonial dinner was tendered Maj. Gen. Charles M. Wesson, Chief of Ordnance, at the Roosevelt Hotel. More than five hundred members and friends of the Association assembled to greet the guest of honor. Brig. Gen. Samuel McRoberts, president of the Post and chief of the New York Ordnance District, presided.

Taking as his topic the program of the Ordnance Department, General Wesson, in an address following the dinner, dwelt upon the proper balance between development and production as related to the armament supplies required under present conditions. "Rearmament for defense," he emphasized, "is a serious subject with us today. If we rearm *more* than is necessary to insure national safety, then we shall be accused of squandering the taxpayers' money. If we rearm *less* than is essential for national safety, we shall be accused of selling the national defense short.

"How far to go in rearming so that a continuing peace will be assured our country is the question we must answer. That question must be answered long before the anticipated time of need, because, as I shall insist later, the materials of rearmament are not commercial materials. They cannot be purchased over the counter. They require a long time for their production. Time is the essential element in any rearmament program, large or small. If there is not enough *time*, there will not be enough armament.

"I have repeatedly stressed the time element to congressional committees and in talks to manufacturers and engineers throughout the country. I claim no originality in this. The importance of the time factor has been stressed by Chiefs of Ordnance ever since this Department of the Army was established."

Continuing, General Wesson said: "When I come to discuss the various essential steps of rearmament, I do not mean to imply that all the armament used by our troops during the World War is hopelessly obsolete at this time. Many items are susceptible of modification into highly acceptable modern equipment. As an illustration, I might mention the famous French 75-mm. gun. It is still the Army's standard field piece, and I believe it to be the equal of any field gun in existence. To make it so, we have discarded the old carriage, which was never satisfactory, and have provided a modern, split-trail, highly mobile mount which affords realization of the full capabilities of the excellent gun and recoil mechanism. Similarly, the famous Browning caliber .30 machine gun of World War days has been modernized into a more efficient and durable weapon. It is still, in our opinion, the best machine gun in existence.

"As the *first* item under a rearmament program, we should, of course, modernize equipment on hand to the extent practicable. I include in this element the renovation of ammunition left over from the World War and now in our magazines. Because of deterioration or obsolescence, this ammunition is not now suitable for use by the troops. The next and most important element should be the provision of sufficient quantities of new types of equipment—types which have been developed within the past few years and which embody in their designs recent advances in science and engineering. I include here such items as heavy, medium, and light antiaircraft matériel, antitank guns, semiautomatic rifles, aircraft machine guns and cannon, field and railway artillery guns and mounts, light and medium tanks, and scout and combat cars.

"I would place next the modernization of the six Ordnance Department manufacturing arsenals. Little change was made in the manufacturing equipment installed in these arsenals for the twenty years following the World War. The sum of $6,000,000 was appropriated last year to start their rehabilitation, and the work is proceeding satisfactorily.

"For several years we have had a modest program for procuring and holding in reserve certain special machinery for the manufacture of powder, small-arms ammunition, and for gun manufacture. This program is proceeding satisfactorily within the limit of appropriations.

"I come now to the last element in my projected rearmament program, and I believe it to be fully as important as any of the others. I refer to the industrial-preparedness activities of the Department. This work is carried out primarily through the Ordnance procurement districts. New York is the headquarters of one of our most important districts. The educational-orders program approved by Congress in 1938 has for its object the furtherance of industrial war planning. Some $16,000,000 has been appropriated for this purpose, of which the Ordnance Department's share is approximately $10,000,000. Even when educational orders have been placed to the extent possible, there still will remain a great many plants with war schedules which will not have had the benefit of educational-order training. Production schedules for critical items have been placed with these companies. These schedules must be thoroughly reviewed, and we hope to be able to pay the companies for detailed production studies covering the items assigned to them.

"I should like now to present to you in general terms the present status of rearmament. The $50,000,000 program undertaken from fiscal year 1939 funds is well under way. Seventy-seven major orders with private industry have actually been completed. Fifty-six orders are still in process. These orders cover the more difficult items—items that require a relatively

long time to produce. Production is, however, meeting our expectation, and both private contractors and the manufacturing arsenals are living up to their schedules.

"Of the approximately $120,000,000 made available to the Department for rearmament during the current fiscal year, some $70,000,000 will go to industry in the form of direct contracts. Approximately seventy-three per cent of this money actually has been placed in the form of contracts, but the bulk of the armament ordered will not be delivered in its entirety for approximately two years. This is unavoidable simply because the items are complicated and because the manufacturers are unfamiliar with their construction and in many cases do not have the proper equipment for their manufacture. In all cases, jigs, tools, fixtures, and dies must be manufactured by the company before production can proceed in quantity. The renovation of ammunition and modernization of matériel is proceeding satisfactorily and will be completed within the 2-year life of appropriated funds."

Other speakers on the program were Tom M. Girdler, chairman of the Republic Steel Corporation and member of the Pittsburgh Ordnance District Advisory Board, and Lieut. Col. L. A. Codd, executive secretary of the Army Ordnance Association. Mr. Girdler's address is published in full on page 304 of this issue.

Honor guests seated at the dais also included Lieut. Gen. Hugh A. Drum, commanding the First Army; Brig. Gen. Earl McFarland, Assistant to the Chief of Ordnance; Brig. Gen. John Ross Delafield, counsel, Army Ordnance Association; Col. James L. Walsh, former chief, New York Ordnance District; Thomas A. Morgan, chairman, Sperry Corporation; E. J. Sadler, vice-president, Standard Oil Company; Col. Thomas F. Brown, assistant chief, New York Ordnance District; E. M. Allen, chief, New York Chemical Warfare Procurement District; Col. L. B. Moody, Ordnance Officer, Second Corps Area; Col. H. K. Rutherford, chief, Planning Branch, Office of the Assistant Secretary of War; Col. J. K. Clement, executive officer, New York Ordnance District; Col. James E. McNary, vice-president, New York Post, Army Ordnance Association, and Dr. Christian F. Reisner, who offered the invocation.

Capt. C. Stewart Comeaux, secretary of the Sporting Arms and Ammunition Manufacturers' Institute of New York, was chairman of the committee in charge of the testimonial dinner. Others who served on the dinner committee and who, with Captain Comeaux, were responsible for its great success, included, in addition to General McRoberts, Colonel Brown, Colonel McNary, Colonel Walsh, and Major Morgan, the following: Col. Crosby Field, vice-president, New York Post; Hartley W. Barclay, life member of the Army Ordnance Association; H. A. Campbell, assistant chief inspector, Bureau of Explosives; W. J. Hoffman, treasurer, New York Post; Lieut. Col. E. F. McCrossin; Col. Charles McKnight; Col. H. B. Machen, vice-president, New York Post; Maj. J. D. Murray; Maj. Gilbert I. Ross; John Hill; Comdr. A. S. Shepard; Charles R. Radley, and James R. White.

This meeting was the climax of a series of historic Ordnance gatherings throughout the country during the year 1939 and marked the close of the Association's twentieth anniversary program. The executive officers of the Association again express thanks to all who assisted in making this meeting such a noteworthy success.

Assistant District Chiefs

THREE new appointees to the personnel of the Ordnance district organization recently have accepted office in their respective areas as assistants to the Ordnance district chiefs. Millar Brainard, vice-president of the First National Bank of Boston, is a new assistant to Col. Charles H. Tenney, chief of the Boston Ordnance District; Dean Witter, a member of Witter & Company, San Francisco, is assistant to Samuel Kahn, chief of the San Francisco Ordnance District, and Allen Rushton, a captain in the Ordnance Reserve Corps, vice-president of the Birmingham Cold Storage & Ice Company and also of the Rushton Corporation, is assistant to Col. Theodore Swann, chief of the Birmingham Ordnance District.

These three gentlemen are well known for their participation in the industrial and civic affairs of their several communities, and each, being typical of the high type of business leader affiliated with the Ordnance organization, is an especially worthy addition to the roster of Ordnance district officials.

Cincinnati Post

THE annual election of officers of the Cincinnati Post, Army Ordnance Association, was held on December 15, 1939, when the following officers and directors were inaugurated: president, J. B. Doan; vice-president, A. H. Tuechter; directors, F. V. Geier, E. D. Smith, A. F. Hubbard, H. C. Knowles, E. A. Muller, R. K. LeBlond, B. B. Quillen, and A. H. Pugh; treasurer, J. D. Wyatt; secretary, Fred A. McMahon.

Massachusetts Institute of Technology Post

AT the first business meeting of the current school year, the Massachusetts Institute of Technology Post of the Army Ordnance Association welcomed new members and adopted plans. Official War Department films will be shown at each business meeting; a 16-mm. projector equipped for sound has been obtained. Again this year members of the Post will visit the Watertown Arsenal and Springfield Armory. These visits have been of great interest especially to members who are students in mechanical engineering and metallurgical subjects. A majority of members are studying either mechanical and chemical engineering or metallurgy. Some are studying industrial engineering in addition to their regular professional course. A visit of inspection to the Quartermaster Depot at the Boston Army Base is also on the program for this year. Next spring, a visit to Fort Devens, Mass., is anticipated where the operation of an Ordnance maintenance company will be studied. A similar organization of the Massachusetts National Guard at Natick will be visited.

The Ordnance students at M.I.T. continue to make an exceptionally impressive record. Of the thirty-five men selected to the honorary military society of Scabbard and Blade, fourteen are members of the Ordnance Unit. Lieut. Philip Constance, Ord. Res., a member of the Post, is now on extended active duty at the Aberdeen Proving Ground. Technical Sergeant Hall, Ord. Dept., is a newly assigned assistant to Maj. H. A. Nisley, who is in charge of the Ordnance Unit.

Lehigh-Bethlehem Post

CAPT. W. S. BROBERG, assistant executive officer of the Philadelphia Ordnance District, was the principal speaker at the meeting of the Lehigh-Bethlehem Post, Army Ordnance Association, held at the Packard Laboratory, Lehigh University, January 7, 1940. Sixty-odd members of the Post were in attendance to hear Captain Broberg's discourse, "Distribution of the Industrial War Load." Following the address, Lieut. Comdr. Gerald B. Linke, naval inspector at Bethlehem, participated in the general discussion. Preceding this meeting an informal supper was held at the Old Sun Inn, Bethlehem, Pa.

At this meeting also the first election of Post officers was held. E. G. Uhl, Lehigh senior, former temporary president, was elected president. R. B. Gerhart of the Bethlehem Steel Company was elected first vice-president and R. A. Carey, Lehigh senior, second vice-president. Elected as secretary and treasurer of the

Post were William R. Csellak, Lehigh senior, and R. I. Felch, Lehigh junior. The executive committee consists of the five officers, Commander Linke, and Robert Caemmerer, Lehigh junior.

The inaugural meeting of the Lehigh-Bethlehem Post was held November 15, 1939—the result of the interest and zeal of Capt. B. S. Mesick, in charge of the Ordnance Unit, R.O.T.C., at Lehigh. The new Post consists not only of the students but of regular members resident in the Bethlehem area. Its officers are divided among the university and industrial members of the organization.

NEW MEMBERS

DURING the period December 1, 1939, to January 31, 1940, inclusive, the following applicants were admitted to membership in the Army Ordnance Association: Albert H. Acken, Newark, N. J.; William Adam, Jr., Jenkintown, Pa.; Donald Alexander, Detroit, Mich.; John E. Alexander, Omaha, Nebr.; Walter Alexander, Wharton, N. J.; George W. Allison, St. Albans, L. I., N. Y.; Walter J. Archinal, Brooklyn, N. Y.; W. R. Argyle, Marcus Hook, Pa.

Ralph H. Bacon, New York, N. Y.; Julian M. Bamberger, Salt Lake City, Utah; Carl P. Bartels, Hamilton, Ohio; Albert E. Bastedo, Hastings, N. Y.; H. G. Batchelder, Pittsburgh, Pa.; John J. Batterman, Cleveland, Ohio; Walter J. Beadle, Philadelphia, Pa.; Laurence G. Bean, Waterbury, Conn.; Eugene L. Beecher, Cleveland Heights, Ohio; Arthur Bentley, Chicago, Ill.; Julius R. Bergmann, Cleves, Ohio; John A. Bickel, Youngstown, Ohio; Charles J. Biddle, Philadelphia, Pa.; Charles A. Bigelow, Wilmington, Del.; Robert L. Biggers, Birmingham, Mich.; F. W. Blair, Ivorydale, Ohio; William N. Blatt, Boston, Mass.; Thornton Bogert, Cincinnati, Ohio; Arthur A. Bolsterli, Bethlehem, Pa.; Garfield A. Bowden, Jersey City, N. J.; Claude E. Bowers, Los Angeles, Calif.; C. Edwin Bristor, Baltimore, Md.; R. K. Brodie, Ivorydale, Ohio; Frank C. Brook, Cincinnati, Ohio; Frank W. Brown, Muskegon, Mich.; Gordon Brown, Montclair, N. J.; G. W. Brown, Richmond Heights, Mo.; William Bruckman, Cincinnati, Ohio; H. L. Brueggemann, Palos Park, Ill.; C. Lalor Burdick, Wilmington, Del.; Denn M. Burgess, Peoria, Ill.; Gilbert Butler, Utica, N. Y.; James Byrne, New Rochelle, N. Y.

A. M. Carey, Brooklyn, N. Y.; Reginald H. Casey, Cincinnati, Ohio; Arthur D. Caswell, Boston, Mass.; Cecil P. Caulkins, New London, Conn.; Samuel T. Chase, Lake Forest, Ill.; Charles A. Chayne, Flint, Mich.; William G. Childress, Port Townsend, Wash.; R. E. Choate, Cedar Rapids, Iowa; Heyliger Church, Cleveland, Ohio; Clifford C. Clark, Cincinnati, Ohio; David B. Clark, Webster, Mass.; John C. Clark, Philadelphia, Pa.; R. E. Clingan, Chicago, Ill.; Harry E. Clo, Chicago, Ill.; Waldo V. Clower, St. Louis, Mo.; George W. Codrington, Cleveland, Ohio; W. B. Coleman, Philadelphia, Pa.; John L. Collyer, Akron, Ohio; Edward P. Connell, Wheeling, W. Va.; Francis J. Connolly, Los Angeles, Calif.; Kenneth F. Cooper, Great Neck, N. Y.; John M. Corbett, Bay City, Tex.; W. E. Corrigan, New York, N. Y.; J. Benjamin Cowan, Canonsburg, Pa.; Gerard C. Cowan, Langley Field, Va.; Edward M. Crane, New York, N. Y.; Albert N. Crawford, Norristown, Pa.; E. Clark Creager, Bala-Cynwyd, Pa.; E. D. Cumming, St. Louis, Mo.; Joseph A. Cunningham, Washington, D. C.; William M. Curphey, Zanesville, Ohio.

John C. Dalton, Chicago, Ill.; J. E. Davenport, New York, N. Y.; Nelson L. Davis, Chicago, Ill.; Anselm De Ghetto, Clifton, N. J.; Richard H. DeMott, Philadelphia, Pa.; James S. Denham, Greenville, Del.; Harry W. Denston, Philadelphia, Pa.; Allen R. Deschere, Bethlehem, Pa.; Douglas C. Despard, New York, N. Y.; Walter P. Dettwiler, Cincinnati, Ohio; Lee E. Dillenbeck, Chicago, Ill.; E. O. Dixon, Milwaukee, Wis.; Harry C. Dodge, Boston, Mass.; J. H. Doolittle, St. Louis, Mo.; Harry R. Drackett, Cincinnati, Ohio; Werner W. Duecker, New York, N. Y.; K. L. Dunbar, Sharon, Pa.; William J. Dunn, Chicago, Ill.; Thomas B. Dutcher, Elkton, Md.

Lloyd R. Earl, Alhambra, Calif.; J. N. Ebling, Maplewood, N. J.; Samuel B. Eckert, Paoli, Pa.; E. J. Edwards, Schenectady, N. Y.; Newpher W. Egge, Springfield, Mass.; Raymond O. Eliason, Washington, D. C.; C. Ellis Ellicott, Jr., Baltimore, Md.; John H. Emmerich, New York, N. Y.; Jordan A. Engberg, St. Paul, Minn.; J. B. Ennis, New York, N. Y.; F. K. Enzor, Columbus, Ohio; David L. Epstein, Chelsea, Mass.; James A. Erwin, Oak Park, Ill.; Benjamin C. Essig, Denver, Col.; Arthur C. Esslinger, Teaneck, N. J.; Alfred L. Eustice, Chicago, Ill.; Eldred E. Evans, Dearborn, Mich.; J. Owen Evans, Washington, D. C.; Ronald K. Evans, Detroit, Mich.; Walter C. Evans, Baltimore, Md.

William A. Faison, Chester, Pa.; E. W. Faulk, Mobile, Ala.; D. D. Felske, Detroit, Mich.; J. W. Ferguson, Jr., Washington, D. C.; W. W. Ferrier, Fort Lewis, Wash.; Everett R. Ferris, Los Angeles, Calif.; E. S. Fields, Fort Thomas, Ky.; George B. Finnegan, Jr., New York, N. Y.; Burnham Finney, New York, N. Y.; William Hugo Fischer, Hartford, Conn.; Edwin A. Fisher, Plainfield, N. J.; Edward T. Fishwick, Glen Ridge, N. J.; W. B. Fogerty, Cincinnati, Ohio; F. J. Foley, New York, N. Y.; Maurice C. Foster, Oklahoma City, Okla.; William H. Foster, Mineola, N. Y.; Henry C. Francis, Dorchester, Mass.; Alexander Fraser, St. Louis, Mo.; Donald S. Funk, Springfield, Ill.

Arthur H. Gaebel, New York, N. Y.; George H. Gerdes, Cincinnati, Ohio; Clarence W. Gibbs, Kew Gardens, L. I., N. Y.; Arthur D. Gillette, Cincinnati, Ohio; Mowry E. Goetz, Sterling, Ill.; George E. Goll, West Hartford, Conn.; Charles Gottschalk, Cincinnati, Ohio; Herman P. Gould, Brooklyn, N. Y.; John B. Gribbel, Philadelphia, Pa.

Edward G. Hail, Providence, R. I.; James E. Hale, Akron, Ohio; H. G. Hamilton, Proving Ground, Ill.; E. J. Hanley, Pittsburgh, Pa.; John D. Harris, New York, N. Y.; M. W. Heinritz, Philadelphia, Pa.; Walter O. Herren, Nutley, N. J.; Gus M. Hess, New York, N. Y.; Joseph H. Hewetson, Cincinnati, Ohio; John W. Higgins, Worcester, Mass.; H. Follett Hodgkins, Syracuse, N. Y.; George E. Hoffstetter, Dayton, Ohio; W. C. Hollander, Pittsburgh, Pa.; William M. Holm, Alameda, Calif.; Glenn G. Holmes, Madison, Wis.; Jesse V. Honeycutt, Bethlehem, Pa.; Ben F. Hopkins, Cleveland, Ohio; C. F. Hotchkiss, Jr., Binghamton, N. Y.; John E. N. Hume, Schenectady, N. Y.; E. J. Hunt, Detroit, Mich.; Ormond E. Hunt, Detroit, Mich.

Harry W. Jarrow, Chicago, Ill.; Irving C. Jennings, South Norwalk, Conn.; Frank E. Johnson, Rahway, N. J.; E. R. Johnston, Newark, N. J.; Charles M. Jones, Trenton, N. J.; Norton T. Jones, Cleveland, Ohio; William J. Judson, Whitmore Lake, Mich.; Frederick Juer, Bethlehem, Pa.

John J. Kaufmann, Middle Village, L. I., N. Y.; Hugh Kaul, Birmingham, Ala.; Douglas R. Keenan, Galveston, Tex.; James H. Kimberly, Neenah, Wis.; Donald H. Kinloch, Parlin, N. J.; Norman J. Kirk, Wyandotte, Mich.; William E. Kirst, Woodbury, N. J.; L. W. Klein, Cleveland, Ohio; Adolph F. Klingner, Hellertown, Pa.; Frank J. Knell, Manhassett, L. I., N. Y.; Emil H. Krall, Decatur, Ill.; Frank M. Kuchar, Montvale, N. J.

August Larson, Metuchen, N. J.; Smith Lee, Los Angeles, Calif.; Gordon Lefebvre, Auburn, N. Y.; Philip C. Leffel, Chicago, Ill.; Chester H. Lehman, Pittsburgh, Pa.; Henry J. Leisner, Philadelphia, Pa.; R. Lenfestey, San Marino, Calif.; Charles K. Lennig, Jr., Philadelphia, Pa.; J. H. Link, Schenectady, N. Y.; Herbert L. Lilla, Chicago, Ill.; Bernhard Littmann, St. Louis, Mo.; W. G. Lockwood, Washington, D. C.; Louis A. Lubow, Durham, N. C.; William V. Luc, Terrace Park, Ohio; Harry F. Lynch, Springfield, Mass.; Nelson M. Lynde, Jr., Fort Knox, Ky; G. A. Lyon, New York, N. Y.

Chisholm N. Macdonald, Detroit, Mich.; James H. Malarkey, Portland, Oreg.; C. W. Manville, St. Louis, Mo.; Charles E. Markham, St. Louis, Mo.; J. David Marks, Maplewood, N. J.; John J. Mascher, Newark, N. J.; Everett M. Mason, Jr., Oakmont, Pa.; William F. McCann, Los Angeles, Calif.; N. J. McGaw, St. Louis, Mo.; Charles A. McGuire, Newgulf, Tex.; John C. McHannan, Cleveland, Ohio; James E. McInerney, Washington, D. C.; F. W. McIntyre, Worcester, Mass.; Herbert E. McMullin, Mount Lebanon, Pa.; George E. McNeil, Jr., Washington, D. C.; Lloyd C. McNeill, Lynchburg, Va.; John J. Meadows, Curtis Bay, Md.; Edward C. Meagher, New York, N. Y.; Clarence R. Meese, Bradford, Pa.; William C. Merrill, Jr., New York, N. Y.; Edward Mika, Philadelphia, Pa.; Charles O. Miller, Detroit, Mich.; Frank F. Miller, Pittsburgh, Pa.; James A. Mitchell, Madison, N. H.; Bernhardt E. Mitler, New York, N. Y.; John Bassett Moore, New York, N. Y.; William J. Morrissey, Philadelphia, Pa.; Arthur H. Morse, Cincinnati, Ohio; Allen W. Morton, Baltimore, Md.; Ira Mosher, Southbridge, Mass.; W. Arthur Murphy, Wilmington, Del.; W. W. Murray, Canonsburg, Pa.

C. J. Nardon, Los Angeles, Calif.; Douglas E. Nash, South Norwalk, Conn.; Alfred Nathan, Jr., New York, N. Y.; Robert L. Neff, Pittsburgh, Pa.; Fred M. Nelson, Newgulf, Tex.; Harry S. Newcomer, New York, N. Y.; F. Harris Nichols, New York, N. Y.; Samuel Niedelman, New York, N. Y.; J. R. Nurney, Washington, D. C.; H. B. Ohmer, Dayton, Ohio; Carroll L. Orr, Newgulf, Tex.

B. R. Painter, Fort Monroe, Va.; John A. Panella, San Francisco, Calif.; Nicholas A. Partenope, West New York, N. J.; George E. Pellissier, Cleveland, Ohio; Walter F. Perkins, Baltimore, Md.; Harold E. Peterson, Auburn, Mass.; Howard B. Peterson, San Francisco, Calif.; Ray Peterson, Peoria, Ill.; Warren A. Peterson, Chicago, Ill.; George W. Petrie, Jr., Oakmont, Pa.; Alva W. Phelps, Saginaw, Mich.; H. L. Pierson, Detroit, Mich.; James H. Pinckney, Garden City, N. Y.; Arthur C. Pletz, Cincinnati, Ohio; Howard L. Pope, Cincinnati, Ohio; Ralph B. Porter, Johnstown, Pa.; William H. Potter, Chicago, Ill.; C. E. Powell, Philadelphia, Pa.; Merrill E. Pratt, Birmingham, Ala.

Warren A. Ramson, Rye, N. Y.; L. B. F. Raycroft, Philadelphia, Pa.; Vincent J. Reade, Jr., New Haven, Conn.; James S. Reid, Cleveland, Ohio; Price R. Reid, New York, N. Y.; L. F. Renneckar, San Mateo, Calif.; Murray H. Resni Coff, Belle Harbor, L. I., N. Y.; H. D. Reynolds, Wilmington, Del.; Warren W. Rhoda, Allentown, Pa.; Cortis N. Rice, Jr., Minneapolis, Minn.; John H. Richards, Wynnewood, Pa.; Harry C. Riddile, Oakmont, Pa.; G. C. Riegel, Peoria, Ill.; William A. Robba, New York, N. Y.; Lohman Roehl, St. Louis, Mo.; W. J. Roehl, Jr., St. Louis, Mo.; Joseph W. Rothmeyer, Detroit, Mich.; William A. Roy, Rahway, N. J.; Charles F. Runchey, Saginaw, Mich.; Henry E. Russell, Greenwich, Conn.; Edwin P. Rutan, Philadelphia, Pa.

Fred L. Sage, Birmingham, Mich.; John St. Lawrence, Erie, Pa.; Leo G. Schmidt, Washington, D. C.; G. August Schneider, Hammond, Ind.; J. F. Schoellkopf, IV, Buffalo, N. Y.; William J. Scott, Westfield, N. J.; Howard P. Semler, Latrobe, Pa.; R. G. Setzekorn, St. Louis, Mo.; Leslie G. Sever, Mt. Vernon, Ill.; Clayton C. Shangraw, West Orange, N. J.; Harry C. Sheaffer, North Hills, Pa.; E. C. Shields, Detroit, Mich.; John G. Shinkle, Aberdeen Proving Ground, Md.; William B. Short, New York, N. Y.; C. B. Singleton, St. Louis, Mo.; Charles E. Slawson, Washington, D. C.; Earl C. Smith, Cleveland, Ohio; Edwin K. Smith, Detroit, Mich.; George W. Snibbe, Baltimore, Md.; Walter D. Snyder, New London, Conn.; Edward L. Solomon, Pittsburgh, Pa.; Edwin B. Sonner, Brooklyn, N. Y.; James T. Soutter, New York, N. Y.; Joseph A. Sowell, Brewton, Ala.; Nelson E. Sowers, Red Bank, N. J.; Charles E. Speaks, Springfield, Mass.; Allen C. Staley, Birmingham, Mich.; John S. Stevenson, New York, N. Y.; Hugh T. Stewart, Philadelphia, Pa.; Watson C. Stoner, Jr., Waynesboro, Pa.; Harry H. Stout, Jr., Plainfield, N. J.; Robert S. Stringer, Baltimore, Md.; William A. Stumpf, West Hartford, Conn.; John A. Succop, Pittsburgh, Pa.; William Summerbell, Washington, D. C.; John H. Sutton, Dayton, Ohio; Harry A. Swem, Newgulf, Tex.

Edwin D. Taylor, Pearl River, N. Y.; Joseph M. Taylor, Pittsburgh, Pa.; Philip F. Thayer, Oakland, Calif.; Paul D. Thomas, Aliquippa, Pa.; John M. Thress, Philadelphia, Pa.; Philip S. Tilden, New Rochelle, N. Y.; Edward S. Tinley, Allentown, Pa.; George F. Towner, Joppa, Md.; James E. Trainer, Akron, Ohio; Herbert B. Trix, Detroit, Mich.; Robert L. Troescher, Youngstown, Ohio; George T. Trundle, Jr., Cleveland, Ohio; Delmar E. Tucker, Philadelphia, Pa.; Ralph A. Turner, La Grange, Ill.; Russell J. Turner, Butler, Pa. H. C. Uihlein, Cincinnati, Ohio; Hugo F. Urbauer, St. Louis, Mo.; A. B. Varble, Dayton, Ohio; David C. Verson, Chicago, Ill.; William H. Vockell, Cincinnati, Ohio.

Erwin H. C. Waldman, Covington, Ky.; Raycroft Walsh, Jr., Hartford, Conn.; Gordon J. Watt, Rochester, N. Y.; Frank E. Watts, Detroit, Mich.; Harry C. Webb, Houston, Tex.; Herman L. Weckler, Detroit, Mich.; Charles A. Weil, New York, N. Y.; Edward W. Weiler, New York, N. Y.; Herbert K. Weiss, Phoebus, Va.; Ashbel R. Welch, New York, N. Y.; Harold F. Welch, New York, N. Y.; Wilmot F. Wheeler, Southport, Conn.; Richard Wilhite, Westboro, Mass.; Charles C. Willits, Washington, Pa.; George A. Wiswell, Philadelphia, Pa.; Dean Witter, San Francisco, Calif.; Albert G. Wolf, Houston, Tex.; Roy R. Yerkey, Forest Park, Ill.; Roy B. Young, Dundalk, Md.; Frederick W. Zimmerman, Davenport, Iowa.

NECROLOGY

BRIG. GEN. JOHN H. RICE, RET., former Assistant to the Chief of Ordnance and Chief Ordnance Officer, A.E.F., 1918-1919, died suddenly at his home at Pelham Manor, N. Y., January 7, 1940. His passing away comes as a profound loss to the Army, to the many officers, enlisted men, and civilian employees who served under him during his more than thirty years in the Army, and to his countless friends in engineering and industry here and abroad. He was a charter member of the Army Ordnance Association and in 1932 was awarded the Association's Medal of Merit for distinguished Ordnance service.

As best describing the record of General Rice and the high esteem in which he was held, we quote the following excerpt from the July-August 1921 issue of ARMY ORDNANCE. This is part of an account published at the time of General Rice's retirement from active military service.

. . . .

General Rice, a graduate of the United States Military Academy, class of 1893, was assigned upon his graduation to the 3rd Cavalry, in which he served until November 21, 1898, when he was transferred to the Ordnance Department. During his service with the Ordnance Department he has, at various times, served at the Watervliet Arsenal, Sandy Hook Proving Ground, Philippine Islands, as inspector of ordnance in Ohio and Pennsylvania, in Washington in the Office of the Chief of Ordnance, as Chief Ordnance Officer of the Southern Department, as chief of the Engineering Division during the war—first in the United States and later in France—as Chief Ordnance Officer of the American Expeditionary Forces, and upon his return to this country as Chief of Manufacture, Ordnance Department.

In the early days of his Ordnance service, he specialized in carriage designing for both mobile and seacoast artillery, and, through demonstrated efficiency and ability, gained the position of chief of the Carriage Division of the Ordnance Department, which position he held at the beginning of the war with the rank of lieutenant colonel. In all our carriage designs there may be

identified excellent features which show the marks of General Rice's ability and good judgment. Up to the period of the war, General Rice served under General Crozier and was one of the real horses of the very efficient team developed by General Crozier while he was Chief of Ordnance in the decade prior to the World War.

At the beginning of the war, the Carriage Division, under General Rice, consisted of 6 officers, 9 clerks, and about 75 draftsmen. It had charge for the entire army of design, procurement, inspection, test, issue, repair, and maintenance of all machine guns, special motor equipment, tanks, and all classes of gun carriages for field artillery, railway artillery and coast artillery, with their equipment and accessories.

From the beginning of the war until December 1917, when the Ordnance Department was reorganized, the Carriage Division, which General Rice reorganized and expanded, placed orders and contracts for about $700,000,000 worth of materials and facilities and transacted all the business of design, inspection, etc., connected with this work, and at the same time increased the personnel during the period by 188 officers and 1,336 civilians and enlisted men—1,700 per cent. The increase in business, as represented by funds involved, was approximately 1,000 per cent, and the actual business was much greater.

At the time of the reorganization of the Ordnance Office on January 1, 1918, General Rice was made a brigadier general in the National Army and designated as chief of the Engineering Division, which he organized and operated. The Engineering Division was charged with the duty of preparing and procuring designs, drawings, and specifications for all classes of ordnance material, and it actually did a great deal of work in connection with procurement and inspection. On June 15, 1918, there were in the Engineering Division in Washington about 400 officers and 1,550 civilians and enlisted men.

General Rice went to France in June 1918, as chief of the Engineering Division of the Office of the Chief Ordnance Officer, A.E.F., for the purpose of coördinating engineering activities in the United States and abroad. He organized and operated the Engineering Division in France until the first of October 1918, when he was appointed Chief Ordnance Officer of the American Expeditionary Forces, and in this position had charge of approximately 2,000 officers and 22,000 enlisted men, as well as procurement abroad, storage, issue, repair and maintenance of ordnance for a maximum of about 2,000,000 troops. After the Armistice and until his return to the United States in August 1919, he had charge of all ordnance work in France.

The character of General Rice's services as Chief Ordnance Officer, A.E.F., was such as to elicit from the commanding general of the A.E.F., General Pershing, a letter of commendation and appreciation for the very excellent services rendered by the Ordnance Department.

Official recognition of General Rice's work is shown by the award to him by our President of the Distinguished Service Medal for his services in this country and in France, and the award to him by the French Republic of the decoration of Commander of the French Legion of Honor.

. . . .

These sentiments were written nearly twenty years ago. The intervening years have but added their measure of affection and esteem to the stature of this truly great man.

MAJ. GEN. EDWIN BURR BABBITT, RET., died at Santa Barbara, Calif., December 9, 1939. He was born at Watervliet Arsenal, N. Y., July 26, 1862. He was graduated from the United States Military Academy, June 1884, and was commissioned a second lieutenant of Artillery. He was retired as a major general on September 19, 1924.

General Babbitt first served with the 5th Artillery at Fort Wadsworth from September 1884 to August 1888. He then attended the Artillery School for Practice, Fort Monroe, until April 30, 1889. He was assigned to duty at Springfield Armory, Mass., and upon the termination of this detail on October 9, 1889, his further assignments occurred as follows: He was ordnance inspector at Thurlow, Pa., to August 28, 1890; assistant instructor of ordnance and gunnery at the United States Military Academy to August 13, 1896; at Benicia Arsenal, Calif., to September 20, 1898; assistant proof officer, assistant to commanding officer, and commanding officer, Sandy Hook Proving Ground, to November 1, 1902, and assistant to the Chief of Ordnance to April 15, 1904.

General Babbitt was ordered to the Philippines, where he served as chief Ordnance officer, Philippine Division, and commanded the Manila Ordnance Depot to September 21, 1906. He next served as assistant to the commanding officer, Rock Island Arsenal, to January 23, 1908. He was a member of the Ordnance Board, New York, to October 6, 1912, and commanded the Sandy Hook Proving Ground to April 15, 1914. He was again assistant to the Chief of Ordnance until December 27, 1917.

He assumed command of the 4th Field Artillery Brigade at Camp Greene, N. C., and in May 1918 accompanied this organization to France, serving with it to April 1919. He served also with the Army of Occupation in Germany.

He was awarded the Distinguished Service Medal with the following citation: "For exceptionally meritorious and conspicuous services. He commanded the 4th Field Artillery Brigade from its organization to the close of hostilities, participating with marked distinction in the actions on the Vesle River and in the Saint-Mihiel and the Meuse-Argonne offensives. The skillful manner in which he pushed forward the artillery units in support of the infantry was a material factor in the successes of those campaigns. In the Meuse-Argonne offensive he had under his command, in addition to the 4th Field Artillery Brigade, the 10th Field Artillery, the 18th Field Artillery, the 205th French R. A. C., and the 2nd Battalion, 308th French R. A. C." He also was an officer of the French Legion of Honor.

General Babbitt was a charter member of the Army Ordnance Association and was known and beloved by many of his fellow members. He had the unusual distinction of serving both in technical and tactical capacities of the highest responsibility, and to both he brought a devotion to duty which resulted in honor not only to himself but also to the Ordnance and Artillery contingents of the United States Army.

RALPH ASSHETON, director of production of high explosives, E. I. du Pont de Nemours & Company, and a charter member of the Army Ordnance Association, died suddenly at Ilchester, Howard County, Md., on January 13, 1940, at the age of 61. He had been ill for over a year and had been on a leave of absence.

Mr. Assheton was widely known for his work on the American Table of Distances, having compiled the statistics which were the foundation of this work. This table is the basis of practically all legal regulations on the storage of explosives and is used in locating explosives-plant buildings and magazines.

He had been employed by the Du Pont Company for thirty-six years—since April 1903. His first position was in the old high-explosives operating department in the Wilmington office. During the World War he was engaged in special duties concerning high explosives with the engineering and purchasing departments.

NOTICE also has been received of the death of the following members of the Association: Donald L. Brown, Hartford, Conn.; Albert S. Fox, New Castle, Pa.; Alfred L. Harrington, Carnegie, Pa.; F. J. Kress, Pittsburgh, Pa.; Maj. W. W. Runyan, Pittsburgh, Pa.; H. G. Williams, Oak Park, Ill.; H. N. Wood, Swissvale, Pa. To their relatives and friends ARMY ORDNANCE, on behalf of the Association membership, extends condolences.

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UNITED STATES STEEL

Ordnance in Review

RECENT DEVELOPMENTS IN SPORTING ARMS, PART II

BY LIEUT. COL. CALVIN GODDARD, ORD. RES.

EUREKA. No, we are not parsing the Greek verb meaning "I find," though time was when we struggled manfully with this and other Hellenic tongue-twisters. Instead we refer to the latest offering in caliber .22 rim-fire target revolvers, just released by the Harrington & Richardson Arms Company of Worcester, Mass. (See opposite page.)

By this time we have become used to deviations from time-worn practices, sprung upon a slightly startled clientele by the firm in question. They have supplied several types of their small-bore target handguns with grips available in eleven different shapes and sizes, which is a practice most agreeable to the individual shooter who thus for the first time is able to secure, in a stock weapon, a "made-to-order" fit, ordinarily to be had only at a considerable outlay over the basic cost of the arm.

Furthermore, in the model immediately preceding the "Eureka" (known as the "Ultra Sportsman") they instituted the very sensible practice of making the cylinder only fractionally longer than the cartridges it contains. For generations men have wondered why it was necessary to deliver a bullet into a revolver barrel from a chamber the over-all length of which so much exceeded that of the cartridge. The result was that the missile, on leaving its case, was forced to travel a considerable distance through a smoothbore cylinder, often of a diameter materially greater than its own, before entering the barrel proper and receiving the support and guidance of the rifling therein. Everyone knew that such a practice was illogical. But the first ones to do anything about it were Harrington and Richardson.

This innovation increased accuracy considerably. Obviously, however, other factors figured in the picture. Very prominent among these was a short "lock time" (that fraction of a second which elapses after the sear releases the hammer and before the latter impinges upon the cartridge case). In the "Ultra" this period, measured chronographically, proved to be just 0.0054-second—its nearest competitor registering 0.0086-second, and the next, 0.00886-second. Since the hammer of the new "Eureka" possesses a fall which appears to be about 1/8-inch less than that of its immediate ancestor, we are prepared to hear of a still more curtailed "lock time" in this model.

ALTHOUGH the "Eureka" and the "Ultra" are, at first glance, very similar in appearance, I noted no less than twenty-five points, some major, some minor, in which they differed *externally*, quite apart from the most noticeable point of all—variation in chamber capacity. The "Ultra" is bored to house nine cartridges in its cylinder; the "Eureka," six. Just why the odd number *nine* was selected, demands explanation. To my best knowledge, this constitutes another of Harrington & Richardson's deviations from accepted usage and one peculiar to that firm. Personally, I think this an unwise deviation and so informed them when they issued their first model of this type, now about a decade since. For these arms are essentially *target* weapons, and modern target practice calls for firing "strings" of *five* rounds. Thus we have a cylinder capable of containing almost, but not quite, enough loads for two strings—a most exasperating situation.

The answer, I am satisfied, is revealed when we remove the grips from one of these weapons and discover the dwarfish, rounded butt frame within—its lines closely following those of the caliber .32 and .38 *pocket* revolvers so long marketed by this firm. Evidently they found certain fixtures used in the manu-

facture of these pocket types suitable in the production of the much more sizable target weapons and, therefore, held the frame dimensions of the latter close to those of the former. This meant a large space for a cylinder; hence a large cylinder. And given a large cylinder, it seemed wasteful to bore only six holes in it when it would accommodate nine. So nine there were!

"EUREKA" REVOLVER WITH SIDE FRAME CUT AWAY

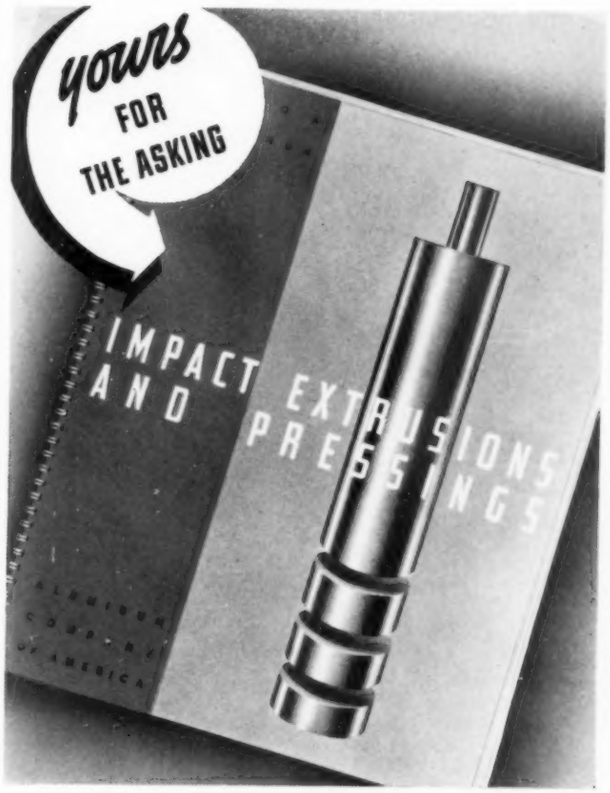
But in the "Eureka," as noted above, we get back to six chambers, although Harrington & Richardson probably will continue to produce some of their less costly arms with 9-chambered cylinders. In this case, the multiplicity of loads is a distinct advantage, for such weapons are not adapted to target work, and when not so used, no good reason exists for restricting cylinder capacity to five or six shots; rather the more that can be accommodated the better.

IN weight, barrel length, and general outlines, the "Eureka" closely follows the "Ultra" and its allied models, the single- and double-action "Sportsman." But it incorporates certain new and important differences in addition to those already enumerated. The action is entirely redesigned, with trigger fulcrum less than half the length of that ordinarily employed, resulting in materially smoother operation. The new hand lever has two points instead of the single one in earlier types, thus conforming with the most accepted practice and still further contributing to ease of manipulation.

A spring plunger at the base of the hammer holds the hand in constant contact with one of the ratchets on the cylinder, thus guarding the hand spring from danger of breakage. A trigger stop had been set into the trigger guard. This reduces trigger travel to that absolutely necessary to proper disengagement of the sear and no more. The curve of the trigger face has been altered and improved.

There is a new and positive cylinder latch, this time on the *left* side of the frame (In previous models it was located on the right). This is a feature easy to build into weapons of the "break-open" frame type, such as that under discussion, but thus far, to my best knowledge, never incorporated in one of the conventional solid-frame variety. It materially simplifies the cleaning of chambers and bore and constitutes one of those little niceties, like a rear-vision mirror on an automobile, that we can do well enough without—until we have once used one! The blade of the new rear sight is set at an angle designed to reduce glare or shadow and is attached by large-headed screws which are much more convenient than the small-headed types on preceding models.

These constitute some of the more noteworthy alterations embodied in the "Eureka." And since the translation of the original Greek form of this word is, "I have found (it)," let us hope that Messrs. Harrington and Richardson will be able to demonstrate that they have produced a revolver so redolent with whatever constitutes "It" in a handgun that its mere announcement to the public will be followed by a rush to the target ranges sufficient to swamp all existing facilities! (*To be continued.*)



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BROOKLYN, NEW YORK

From the Record

The following quotations are from addresses or writings of recognized authorities and comprise a cross section of opinion on subjects closely allied to the national defense. They have been selected for publication as being important and timely. Through this medium, ARMY ORDNANCE *hopes to acquaint readers with qualified views regarding various phases of industrial preparedness.*

IN THE FUTURE, AS IN THE PAST, WE MUST BE ready to defend our American policy against hostile intervention. In these days of the long-range bomber and the protracted cruising submarine, the security that our oceans have afforded us against the traditional methods of attack, has become less potent. Our armed forces must therefore be strong enough to defend America against the newer, as well as against the old, weapons of aggression.

To achieve adequate national defense for our Army today, we need men. We need money. We need munitions. We need physical reserves of supplies to cover at least the first six months of any major emergency, or better, until our industry can go into mass production and mass delivery of war supplies. We need civilian factories trained in the art of producing munitions so as to be able to guarantee our fighting forces a flow of materials throughout a war of any proportions.

All these needs are cogent; but above them all is our greatest need—the element of time. Time to enlist, train and equip men; time to spend money wisely, so as to assure ourselves a maximum result for our investment; time to manufacture munitions, many of which have no counterpart in civilian life; time to train a civilian industry to shift from a peace to a war basis with a minimum of waste, delay and confusion; time to plan, time to experiment, time to perfect. Time! That is the challenge to the American people. That is the challenge to the American Army. Adequate national defense rests as much on adequate organization as on any other single factor—and organization takes time.—*Hon. Louis Johnson, the Assistant Secretary of War, before the New York Herald-Tribune Forum, New York City.*

GEN. CHARLES P. SUMMERALL, FORMER CHIEF OF Staff of the Army, writing in the American Legion Magazine, has given high praise to the Reserve Officers' Training Corps. In this article the General first considers the Regular Army, which he terms the "first line"—always immediately available—as an insurance policy which we can turn to at once when trouble looms. He then pays tribute to the National Guard, which he places directly behind the Regular Army—"A strikingly efficient force, developed successfully from the militia; and we must regard it as scarcely less effective than the Regular Army as an insurance policy to which we can turn quickly in case of trouble and as a reënforcement for the Regulars."

Behind these two lines of defense comes the great civilian army which, after all, is the war strength of America. It is represented today by the Officers' Reserve Corps and the two distinct feeders for that component—the C.M.T.C. and the R.O.T.C. It is this latter component to which the General directs the remainder of the article. He reviews the educational-institution military-training system since the Civil War and refers to the provision of officers for our World War Army through the Officers' Training Camps which were started all over the country within a month after we entered the war.

"It is my firm belief," writes General Summerall, "that dollar for dollar, the national-defense money spent on the R.O.T.C.

brings at least as good returns as that spent on any other element. I really believe that because of the high intelligence level of the students, their keen insight into current problems, and their ready interest in military courses, we are developing men who will be effective leaders in war."

THE GENERAL OBJECTIVE OF THE EDUCATIONAL-orders program is to prepare industry for the war production scheduled to it by procurement plans. In some cases it may be possible under the educational order to prepare a plant quite completely for its war mission. The minimum that is expected is one set of special equipment, with drawings, specifications, patterns, etc., permitting duplication, and such production and engineering data as is possible of development in time of peace to reduce to a minimum the time needed to get into quantity production in war.

More specifically, the Signal Corps program will be aimed at educating a number of manufacturers in actually producing a small quantity of field wire and in securing production data that will be useful in reducing the time required to get into quantity production of this field wire in an emergency. It is hoped that the production analysis that will be secured will provide: A plan for any necessary conversion of the plant; an itemized list of the new machines, manufacturing aids, special tools, etc., that will be required, together with a schedule of components or accessories to be supplied from outside sources and work to be performed by subcontractors, and preferred sources of such materials or services. The elimination of bottle necks resulting from a paucity of subcontractors will be a primary objective. . . .

In these uncertain times it is indeed gratifying to know that the Army has the active support of the wire industry in attacking the war procurement problem. It is a problem requiring mutual assistance and an effective solution. The time is ripe for critical scrutiny of all our joint planning and, more particularly, a recheck of all accepted schedules of production. The final plans evolved must be capable of execution and sufficiently flexible to be correlated to contemporaneous conditions. The national defense must be based upon the proper utilization of the wire industry.—*Maj. Gen. Joseph O. Mauborgne, Chief Signal Officer, U. S. Army, in an address before the annual meeting of the Wire Association, Chicago, Ill.*

WE MUST REALIZE THAT, LIKE A NAVY, AN AIR force must have a base from which to operate. The most effective means of seeing to it that enemy planes shall not fly over our cities and our factories and our homes is, therefore, to see to it that no enemy air bases from which a hostile attack might be launched are permitted to be established within the definition of our territorial waters. Air bases are particularly vulnerable to attack from the air, and so long as we continue to develop bombing airplanes for our Air Force superior in speed and cruising range to those developed in foreign countries we may feel more secure in the thought that an enemy base within striking distance of our shores may be made highly untenable and that, with our bases in Panama and Puerto Rico, a threat against our vital interests in the Caribbean area and the Canal Zone, or to our sister republics to the south, is greatly minimized.

So far, I have intentionally mentioned only the bombardment airplane because I believe that in any type of military combat the nation which has the longer-range weapons possesses a tremendous advantage and because it is a weapon peculiarly fitted to our geographic location and to our present concept of hemisphere defense. It is, indeed, our basic Air Force weapon. It possesses sufficient bomb-carrying capacity and has sufficient range to enable it, from established bases and those now under construction and projected, to reach any locality where a hostile force might attempt to establish a base inimical to our interests. —*Maj. Gen. Delos C. Emmons, commanding the GHQ Air Force, in an address at the dedication of the Kansas City Municipal Airport.*

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Book Reviews

THE REVOLUTION OF NIHILISM. By Hermann Rauschning. New York: Alliance Book Corporation. $3.00.

THE object of this book is to reveal the purpose and process underlying the Nazi movement. The author feels that Naziism is a sort of Frankenstein creation which in the end will destroy itself. National Socialism is described as "action pure and simple, dynamism *in vacuo*, revolution at a variable tempo, ready to be changed at any moment." The author paints a rather somber picture, and fears that after the termination of the present régime Nazi youth, which has become imbued with the idea of power, may lead Germany into a "colossal adventure from which there can be no return" unless the movement can be suppressed.

This book tells us "those who know Germany, know that the nation no longer credits itself with a will of its own, so deep has it sunk in five years of bondage. If war comes, the nation will fight, and at the outset, perhaps, even magnificently. It will yield to every appeal to its passions. But of one thing, in its degradation, it seems to be no longer capable—action on its own initiative." This is exactly the result the Nazi leaders wished to achieve; however, no doubt the day will come when the creative and regenerative energies of the people will be needed, but will be lacking. Despite all that has happened, the Nazis claim their policy is one of peace and justice, but a peace which shall make Germany the "mistress of the globe," not one which hangs on the "palm fronds of lachrymose pacifist womenfolk, but established by the victorious sword of a master race."

The author also says: "The weakness of the whole German system, which no one capable of judgment can deny, renders the future entirely uncertain. The nation itself bears the plainest marks of its injuries. This nation, driven, hunted, hopeless, obeying only impulses from without, continually shaken out of its composure, robbed of its self-reliance, in constant anxiety, losing spirit, losing elasticity, but excited into hysterical outbreaks, has become a sick nation, mentally unbalanced and neurotic. Such a nation is not in a condition to face a new war."

The subtitle of this book is "Warning to the West," and hence it should be on the bookshelf of every one interested in studying this new world situation. F. H. W.

SOLDIERS IN THE SUN. By William Thaddeus Sexton. Harrisburg, Pa.: The Military Service Publishing Company. $2.50.

HERE is a story of America's first attempt at colonial empire, and the author, by his genius in assembling and recounting the proper incidents in the proper way, rather than propounding his own theories, has brought out and proved many things about our acquisition of the Philippines.

The incidents surrounding the taking over of the Islands are well brought out. Most interesting is the account of the recruiting of a volunteer army in the face of hostile and active "anti-imperialistic" groups of politicians and politically minded newspapers. The so-called "inefficiency" of our citizen officers and soldiers has long been a target for writers, but one gets the impression from the incidents told in this book that the zeal and sacrifice of our raw recruits soon overcome lack of discipline and training. One feels that America can trust her man power to meet any situation within a reasonable time. Students of our national defense have long contended that our munition power is coequal with our man power problem.

Much is to be learned from this book that is useful today, and at the same time the reader will find a story more interesting than ordinarily will be found in a campaign history. G. S. B.

THE BRITISH WAR BLUE BOOK. New York: Farrar & Rinehart, Inc. $1.50.

THIS book is essential to a proper understanding of the beginnings of the present European war. It is a Command Paper presented by the Secretary of State for Foreign Affairs to Parliament (Miscellaneous No. 9, 1939). It contains all the pertinent documents concerning German-Polish relations and the outbreak of hostilities between Great Britain and Germany on September 3, 1939. The volume thus is not only of immediate interest but also of permanent documentary value. L. A. C.

GUN COLLECTING. By Charles Edward Chapel. New York: Coward-McCann, Inc. $2.50.

DIVIDED into sixteen short chapters, an appendix, glossary, bibliography, and index, this work covers briefly the evolution of the hand firearm, with descriptions of each basic type and how it evolved from its predecessor. It then takes up "freak" weapons, the classification and identification of specimens, price fluctuations as functions of supply and demand, the condition of the individual piece and how it affects value, gun collecting for profit, and gun photography. In the appendix we find material on gun exhibitions, dealer lists, and the names of clubs and periodicals useful to the collector.

The 10½-page glossary which follows is susceptible of amplification, plus an occasional correction as well. Thus we are informed (p. 220) that a "Pump Gun," is "a *repeating rifle*, especially one with a *lever suggestive of a pump handle*" (italics mine). Apart from the fact that a pump gun is usually a *shotgun* and possesses, not a lever, but a reciprocating hand grip below the barrel by which it is operated, the definition is essentially correct.

Happily, however, no similar *bêtise* appears in the pages of the work. Indeed, considering that it is for the uninitiate and not for critical dissection by the expert, it is remarkably free of error, though here and there, sins of both omission and commission, occasionally crop forth.

Furthermore, Chapel has done something which others might have done, should have done—but did not do. He has given us the first volume in English on gun collecting. More power to him in his generation! C. G.

ANNAPOLIS TODAY. By Kendall Banning. New York: Funk & Wagnalls Company. 1939. $2.50.

WHEN ARMY ORDNANCE, in its issue of March-April 1938, reviewed Kendall Banning's "West Point Today," it paid tribute to the researches and energy of a man who, as stylist and analyst, captured the spirit of the Military Academy physically and psychologically. He has done equally well in this narrative of the Naval Academy. Here he presents the career of the typical midshipman from that first exciting day when he is sworn in as a plebe to the occasion four years later when he receives his commission as an ensign in the Navy or a second lieutenant in the Marine Corps. These four years of training are largely responsible for the splendid *esprit* characteristic of the United States Navy. All citizens would do well to study and know the secret of this great tradition.

"Annapolis Today" has a broader significance in that it acquaints the reader or the visitor to Annapolis with the plant and equipment of the Naval Academy. Thus in addition to an introduction to the life of a midshipman, the school itself, and the Navy and its traditions, Banning's book becomes also a Baedecker.

Little need be added by way of comment upon the discernment and ability of Kendall Banning. He has achieved a place in American literature as the foremost of current authors on our great service institutions. A keen knowledge of humanity, a broad vision of causes and effects, and an appreciation of tradition are characteristic of his work. L. A. C.

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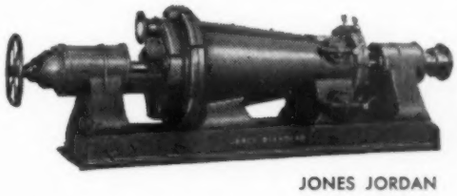

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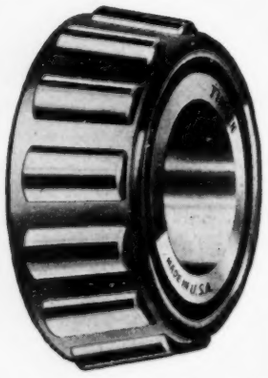

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